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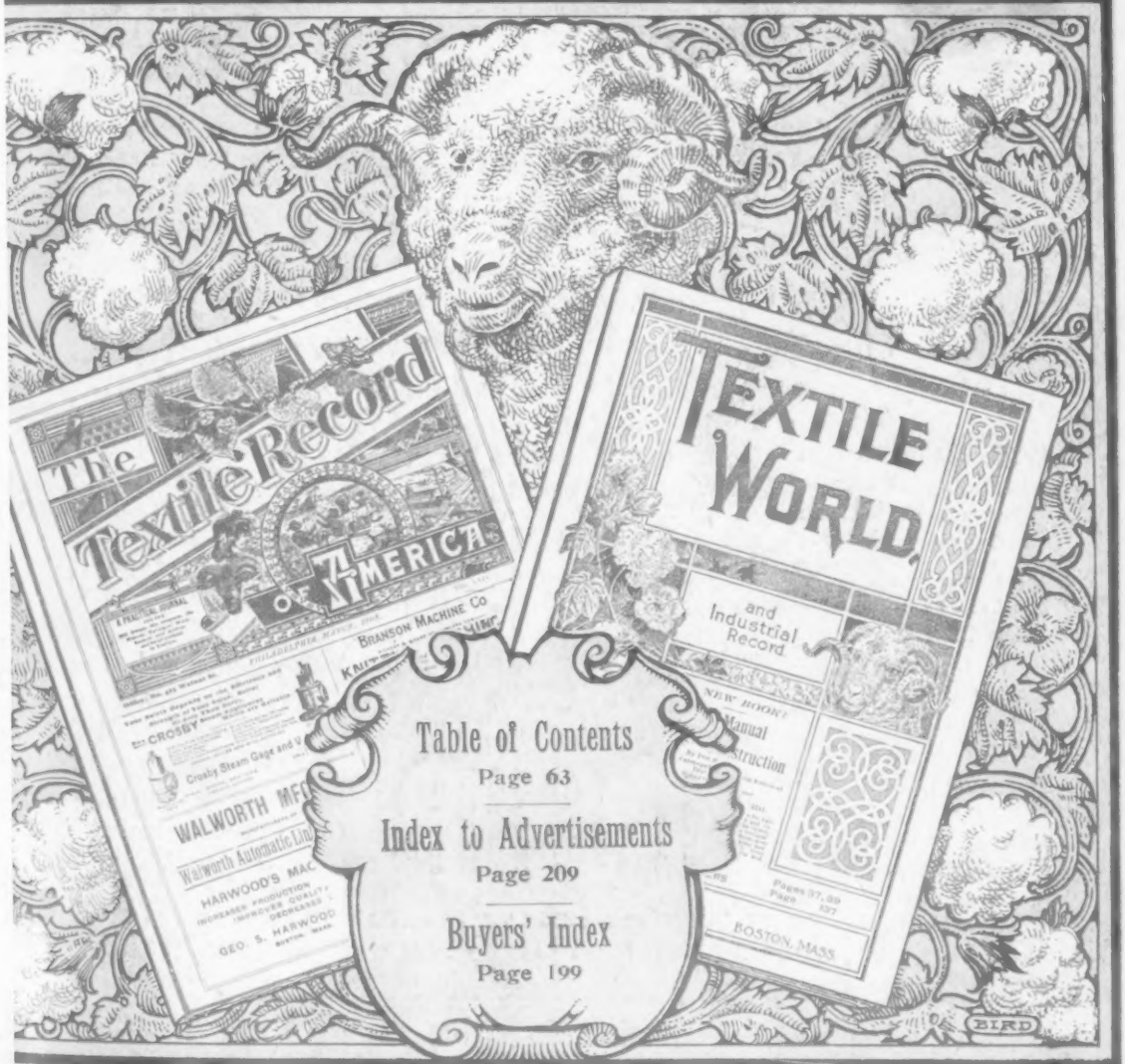

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e Reports of the Proceedings of the Meetings of the N. E. Cotton Manufacturers' Ass'n at Boston and the American Cotton Manufacturers' Ass'n at Knoxville are contained in this number.

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Calenders for Rolling, Glazing, Chasing and Embossing, also Callenders for Moire Finish.

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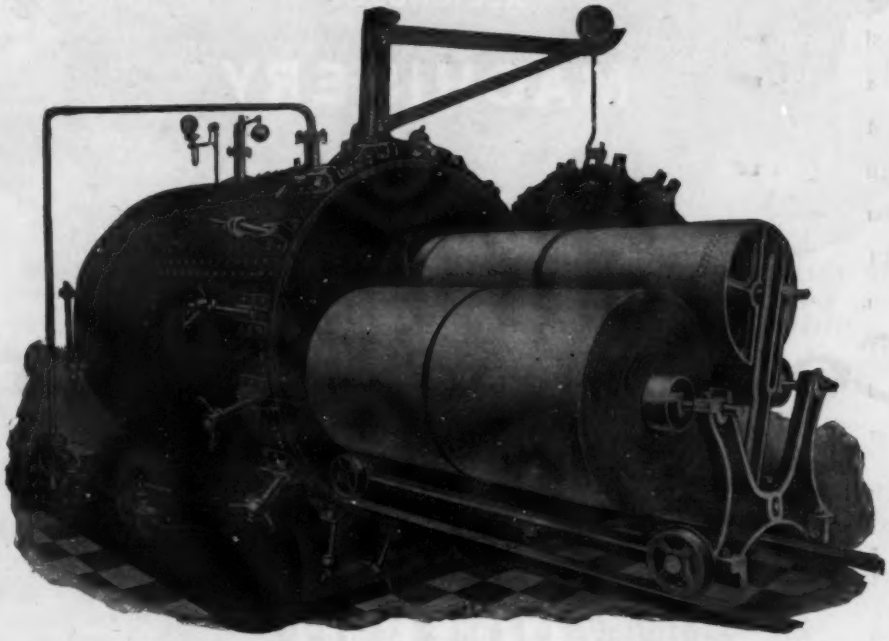

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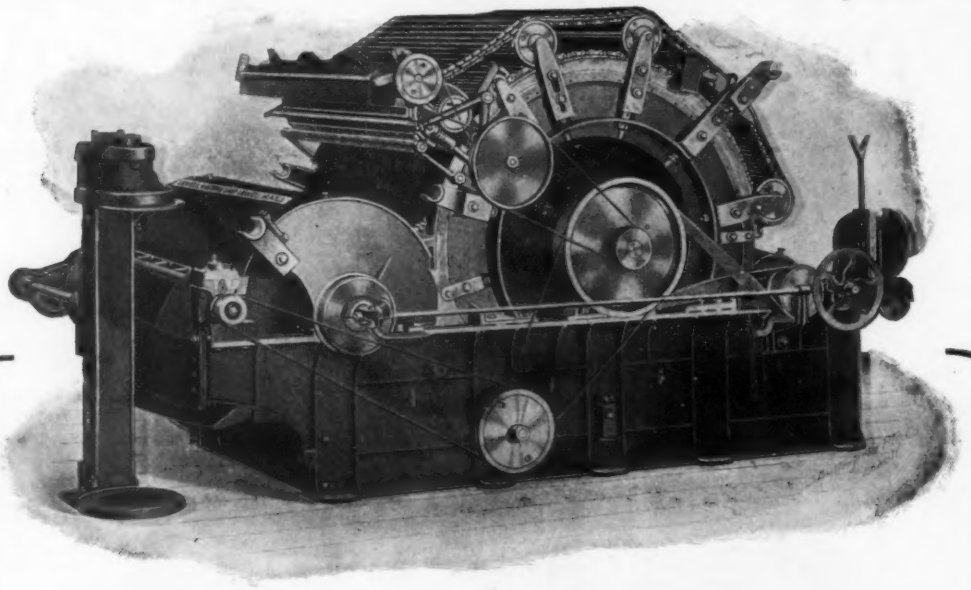

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Plans, Specifications and Estimates furnished upon application.

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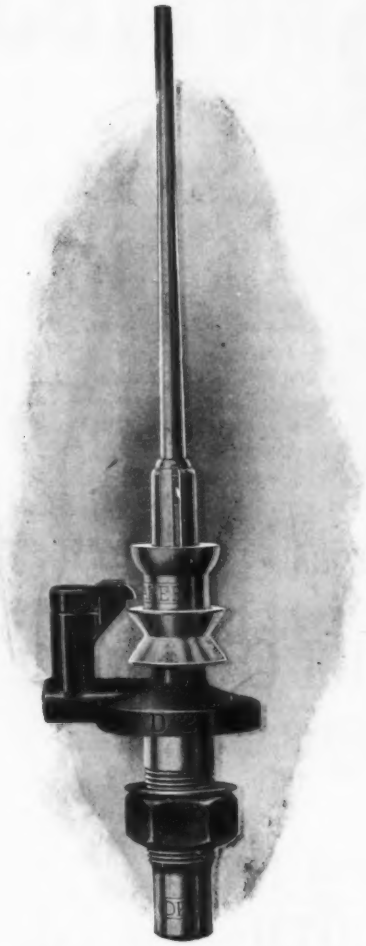

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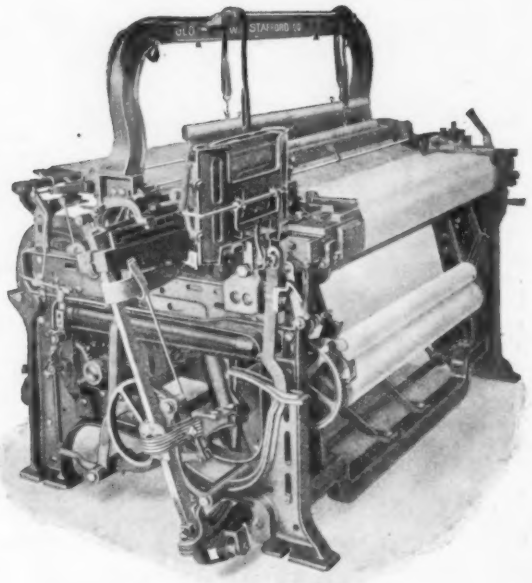

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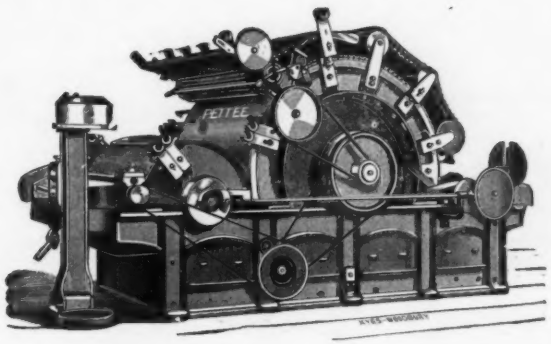

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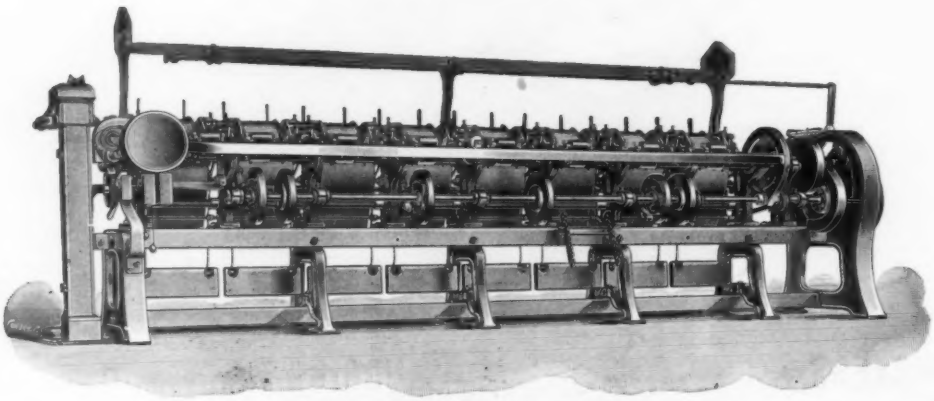

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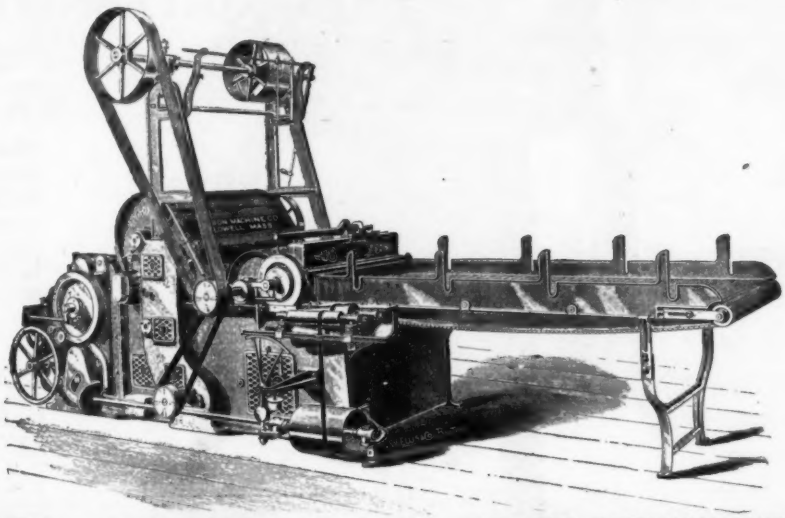

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The illustration shows our

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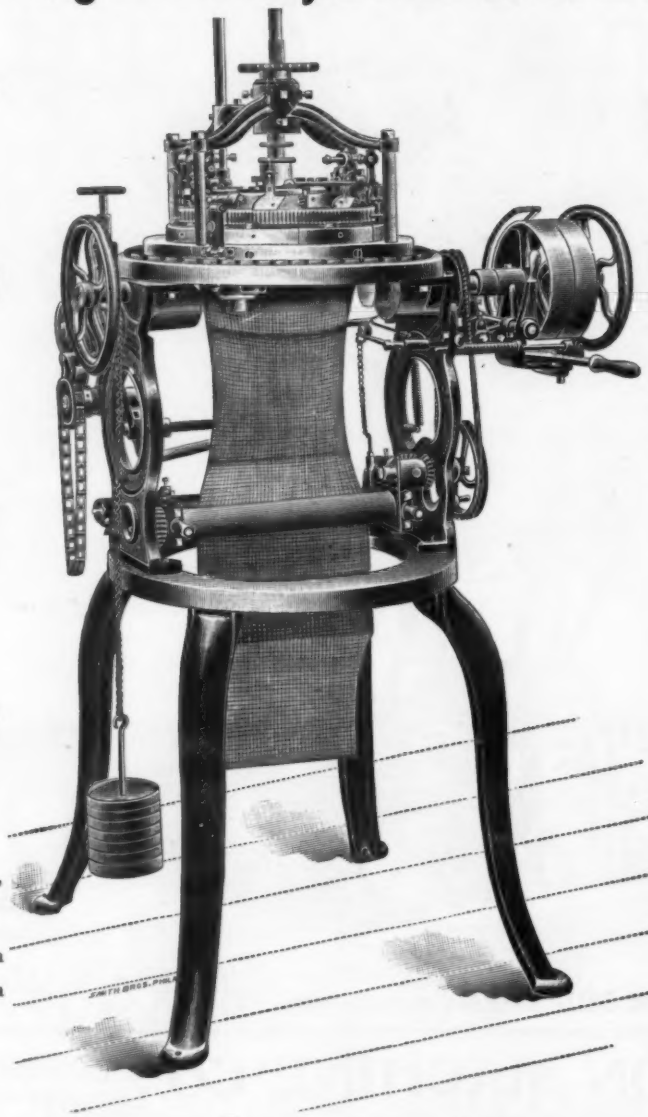

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Improved Measuring Device, by actual length knit.

Sizes. 8 to 24 inches, inclusive, varying by one inch.

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Solid Forged Steel Cylinders, specially hardened or with patent inserted walls for fine fabric.

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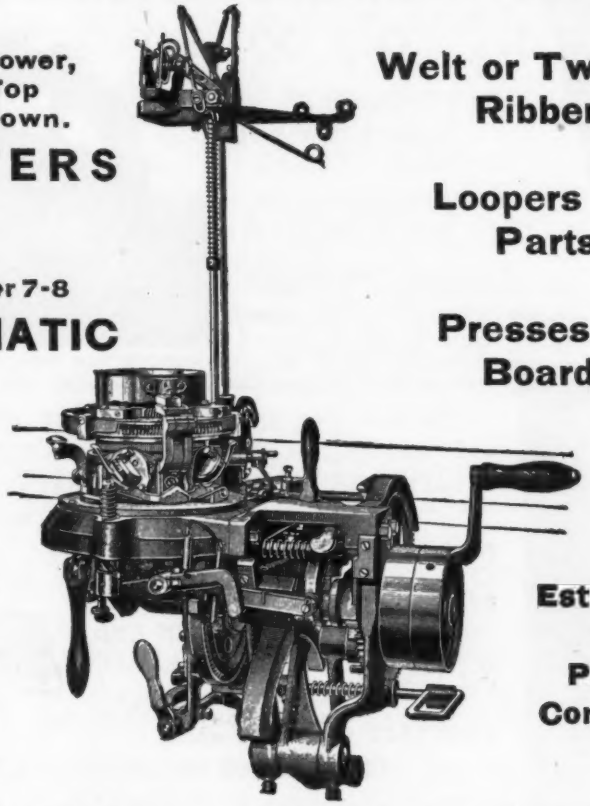

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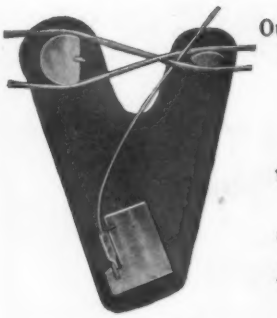
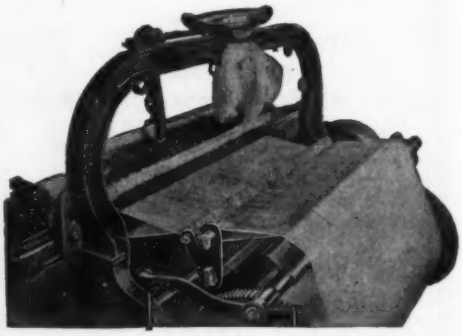
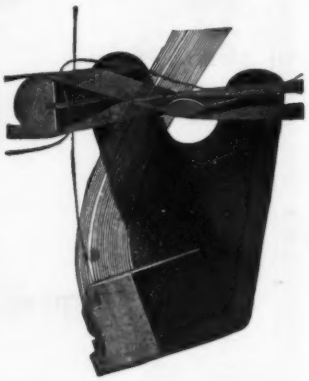


Our **WARP-STOP** controls
TWO threads by ONE spring WIRE, held in a COMB,
engaging the warp
in such a way that
the TENSION is
UNDER CONTROL,
and
ABRASION of the
yarn is AVOIDED.



The COMBS are RAPIDLY INSERTED, BEFORE or AFTER the warp is in the loom, and are carried in a bar suspended from **the LEASE-RODS** which **ARE NOT FIXED** to the loom side, but **FREE to take their proper positions,** and **ALLOW the NATURAL MOVEMENT of the WARP,** so that **the COVER of the cloth is UNAFFECTED.**

When a thread breaks the WIRE SPRINGS OUT from the comb, thus giving
a CLEAR SIGNAL of the place
of the BROKEN END,
and, by striking
a CONTACT SLIP upon which
LINT CANNOT COLLECT,
closes the circuit through
a PERFECT KNOCK-OFF, EASILY and RAPIDLY FIXED, and **actuated by a SPARKLESS current.**



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Harding's Pins and Circles, Varey's Fallers, etc.

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The Nasmith Comber

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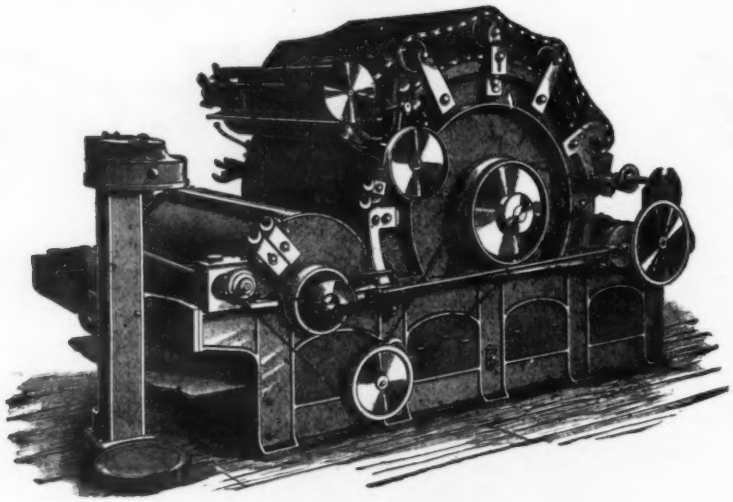

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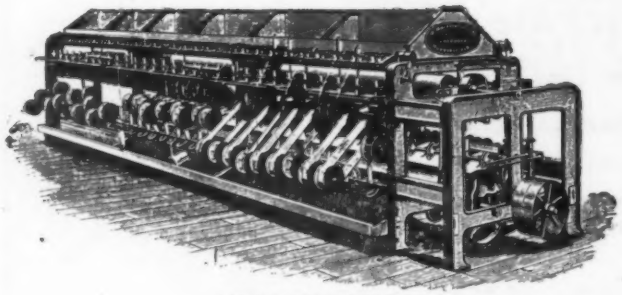

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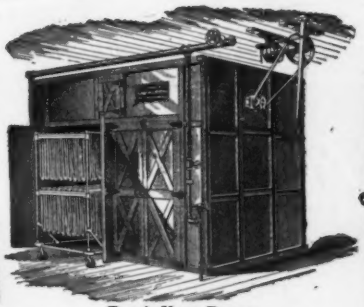

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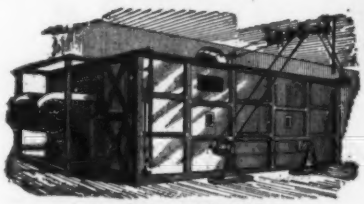

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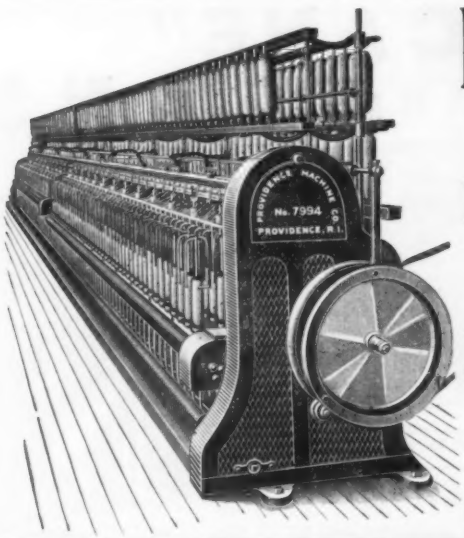

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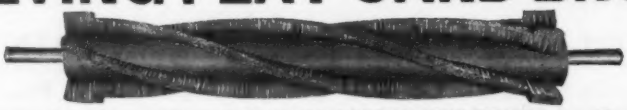

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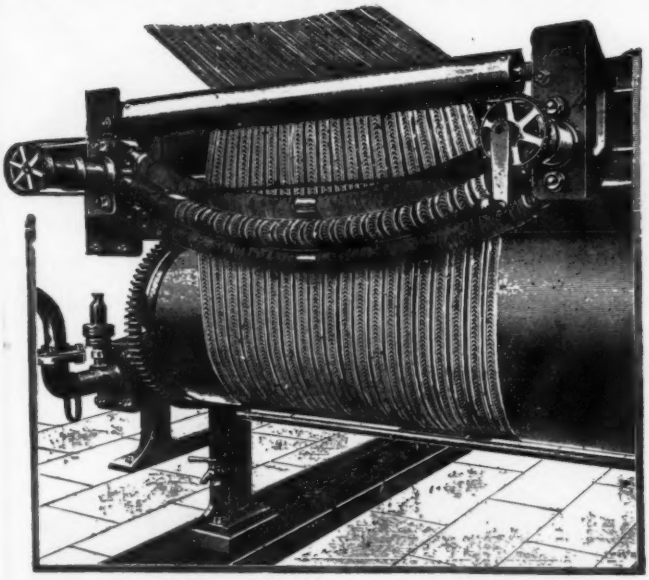

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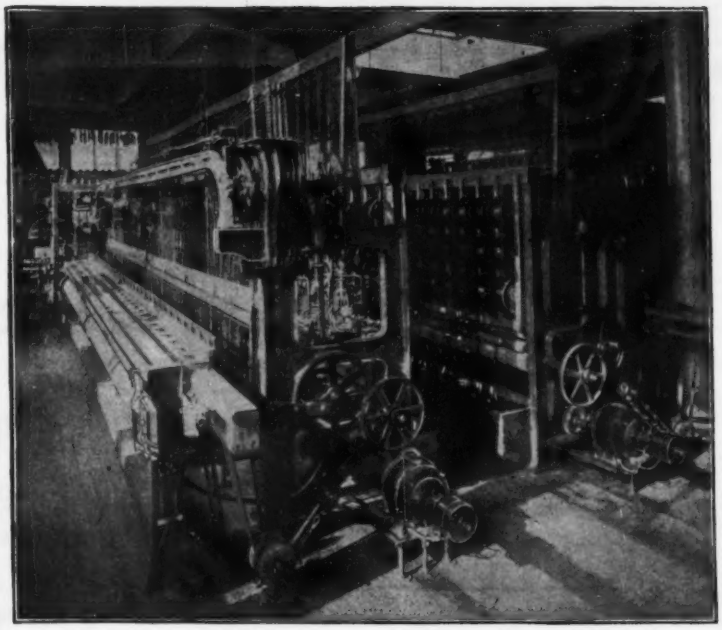

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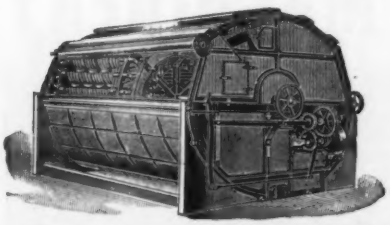

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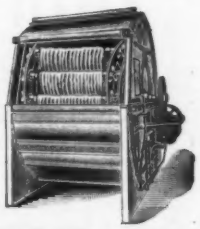
No Tangling.

CAPACITY
50 to 700 lbs per batch.



THE KLAUDER-WELDON DYEING MACHINE CO.

AMSTERDAM, N. Y.

Builders of Machines

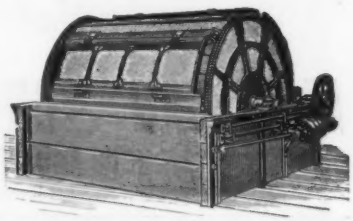
For Skein—Worsted, Slubbing, Cotton and Silk.
" " and Warp Mercerizing.
" Raw Stock Cotton, Wool, Waste and Rags.
" Garments Underwear, Hosiery and Caps
" Sulphur Colors—Raw Stock, Skein and Hosiery.

RAW WOOL AND COTTON MACHINES.

CAPACITY
200 to 1000 lbs per batch.

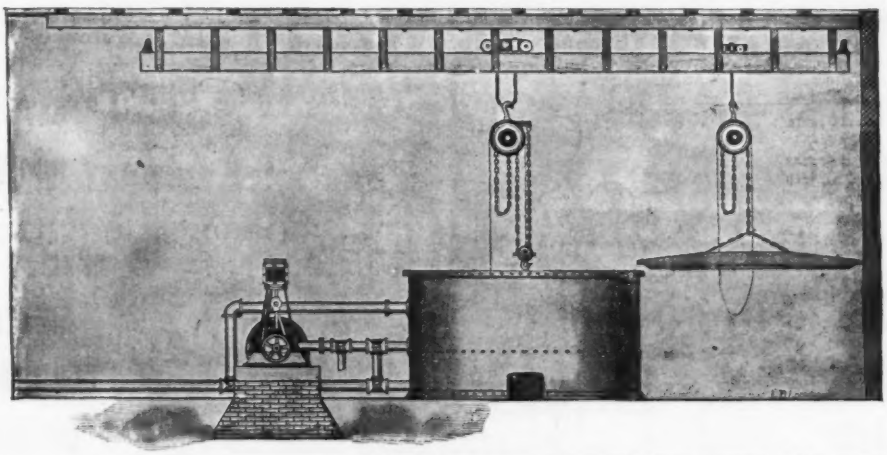
SAVES

50% in Labor besides Steam and Dye Stuffs. Practically indestructible. Leaves stock in perfect condition.



VACUUM DYEING MACHINE CO., CHATTANOOGA, TENN.

RAW STOCK, YARN AND HOSIERY DYEING MACHINES



OFFICE OF TREMONT & SUFFOLK MILLS, LOWELL, MASS., Jan. 14, 1904.

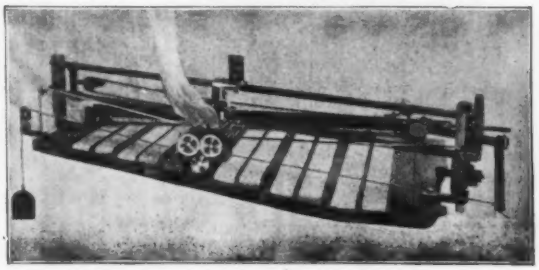
VACUUM DYEING MACHINE CO., Chattanooga, Tenn.

GENTLEMEN: Repiying to your inquiry in regard to what we think of your Raw Stock Dyeing Machine, would state that we have been using one about six months, with very satisfactory results, the dyeing being level, and the stock left in first-class condition for spinning. Can give your machine no better recommendation than to say, we think so well of it that we have just placed an order for two additional machines.

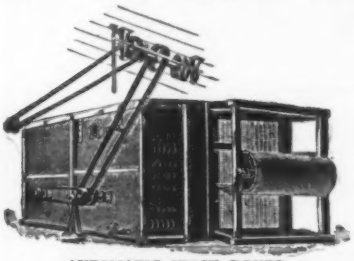
Yours truly J. J. CONNELL, Agent.

"20th CENTURY" MACHINERY

Dryers for Wool and Cotton Stock, Yarn, Stockings and Underwear. Carbonizers, Ventilating Fans, Yarn and Wool Scouring Machines, Cloth Washing and Dyeing Machines, Tom Toms, Chroming Oxidizing Machines.



WEB FEED.



AUTOMATIC STOCK DRYER.

We also manufacture Kershaw's Geared Traveler and Improved Web Feed.

AMERICAN DRYING MACHINERY COMPANY,

19th AND WESTMORLAND STS., PHILADELPHIA, PA.

ALEXANDER & GARSED, Charlotte, N. C., Southern Representatives.

HENDERSON'S

Double Carding Process for Wool

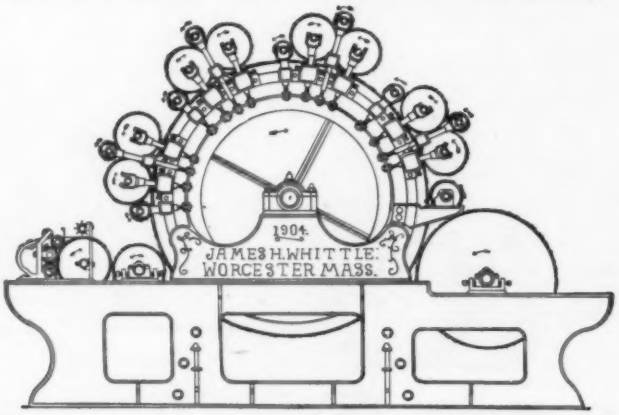
(Patented May 10, 1904)

Is a Great Success.

Manufactured By **JAMES H. WHITTLE,** 150 Harlow St., Worcester, Mass.

INCREASES PRODUCTION AND QUALITY

SAVES LABOR



SAVES ROOM

APPLIED TO EITHER OLD CARDS OR NEW

WOOL AND WORSTED MACHINERY

Including Carding Machinery for Wool and Worsted, Yarn Twisters, with or without Novelty Attachments, Yarn Dressers, Reels, Beamers, Single or Double. Yarn Spoolers, Dresser Creels, Cloth Dryers, of all widths, New Rotating Skein Dryers, Four and Eight Drum Spoolers, Improved Hydro Extractors, Improved Dusters with Fan, New Pattern Mixing Picker, Skein Drying Reels, etc.

Southern Agents: Alexander & Garsed, Charlotte, N. C.

HARWOOD'S MACHINERY

Increases Production,
Improves Quality,
Decreases Labor Cost.

THE BRAMWELL FEEDER (over 12,000 now in use.)
For Woolen, Worsted, Shoddy and Hosiery CARDS and GARNETT Machines.

THE APPERLY FEEDER (over 15,000 in use.)
For Second Breaker and Finisher CARDS.

THE BRAMWELL PICKER FEEDERS (two styles.)
For Burr and Mixing Pickers, also Fearnaughts.

THE NEW 1902 BRAMWELL OPENER AND FEEDER,
A Complete Machine. For Wool Washers and Wool Dryers.

SOLE AGENTS FOR THE SPENCER AUTOMATIC STOCK OILER,
Send for Sheet of Testimonials. Saves Oil, Labor and Waste.

A NEW CLUTCH ATTACHMENT FOR BRAMWELL FEEDERS,
Positive and Durable.

A FULL LINE OF PINS AND PARTS FOR LAMAIRE FEEDS.

IMPROVED APRONS AND REPAIRS OF ALL KINDS.

GEO. S. HARWOOD & SON,
53 State Street, Room 703,
BOSTON, MASS.

Long Distance Telephone, 3212 (Main) Boston.

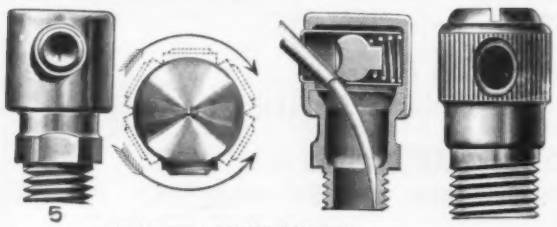
There is No Universal Elevator or Conveyor

No one appliance can be made to successfully cover the field of conveying work.

Standard conditions are met by using standard equipments,—but unusual conditions must be met by unusual equipments. To be safe in the design and construction of unusual conveying machinery necessitates vast experience, constant vigilance, and courageous initiative. We always give just such attention to every detail of our work.

The Link-Belt Engineering Company
Philadelphia

New York, 49 Dey Street *Pittsburg, Park Building* *Link-Belt Machinery Company, Chicago*



5

POSTAL WILL BRING SAMPLE

A New Plant

of machines that have no protection to the oil holes leading to a bearing is not modern construction.

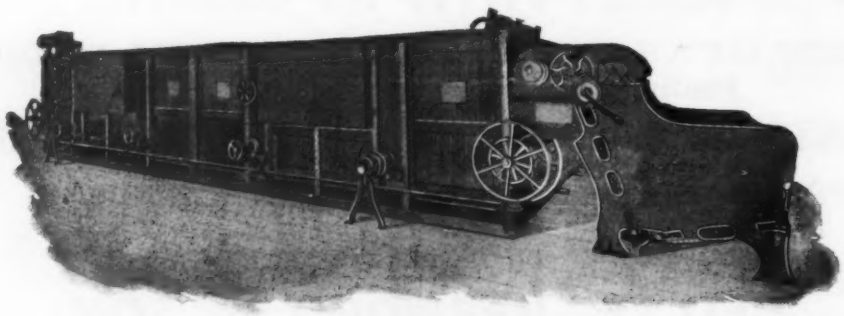
When ordering new equipment specify

TUCKER Dust Proof OIL **CUPS**

W. & C. F. TUCKER, HARTFORD, CONN.

C. G. SARGENT'S SONS,

GRANITEVILLE, MASS.

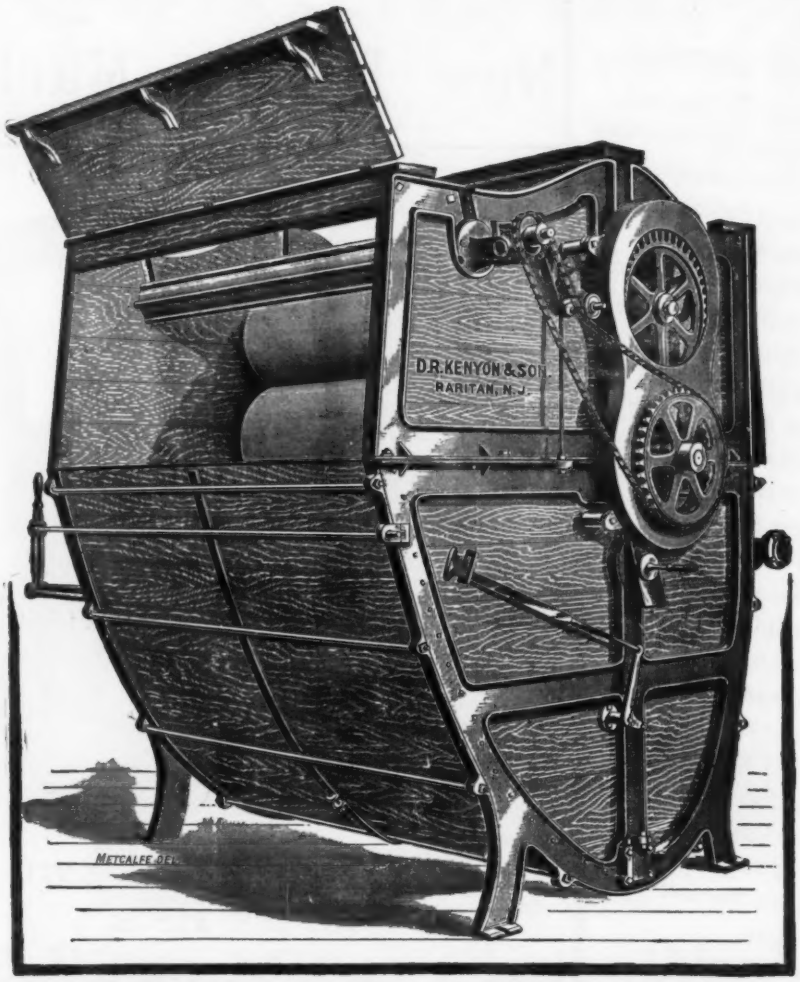


... BUILDERS OF ...

Stock Dryers, Wool Washers,
Wool Dusters, Carbonizing Plants,
Burr Pickers, Etc.

Kenyon's Improved Cloth Washer

FOR FOUR, SIX OR EIGHT STRINGS OF GOODS



BEST QUALITY SOLID ROLLS.

Improved trough and valves, preventing wash of liquor and insuring quick and thorough scouring and rinsing.

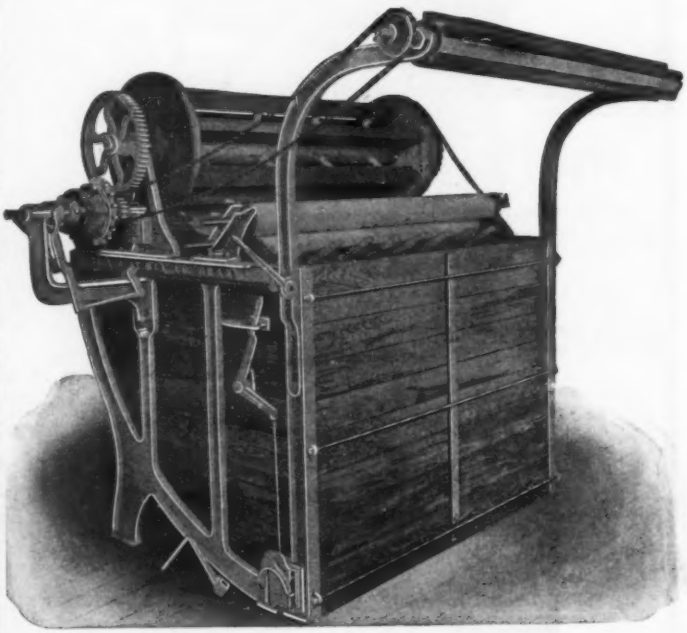
D. R. Kenyon & Son, RARITAN, N. J.

BUILDERS OF WOOLEN MACHINERY

RODNEY HUNT MACHINE COMPANY

WATER WHEELS,
Horizontal and Vertical.
Iron Flumes and Penstocks.
Rotary Fire Pumps.
Centrifugal Pumps.
Head Gate Apparatus.
Water Wheel Regulators.
Rotary Fulling Mills.
Rotary Cloth Washers.
Rotary Knit Goods Washers.
Combined R'y Fulling Mill and Washer for Knit Goods.
Endless Felt R'y Washers and Rotary Felling Mills.
Hammer Falling Stocks.
Dolly Washers.
Crank Fulling Mills.
Crank Knit Goods Washers.
Wringing and Rinsing Mchs.
Reel Dyeing Machines.
Carbonizing Machines.
Bleaching Machines for Chloride of Lime and Peroxide of Sodium,
Dye Tubs and Rinsers.
Wool Washers.
Soaping Machines.
Cloth Winders.

New Dyeing Machine



TYPE L. FOR CLOTH AND KNIT GOODS IN THE PIECE.

TYPE M. FOR BLEACHING COTTON KNIT GOODS, CIRCULAR No. 16.

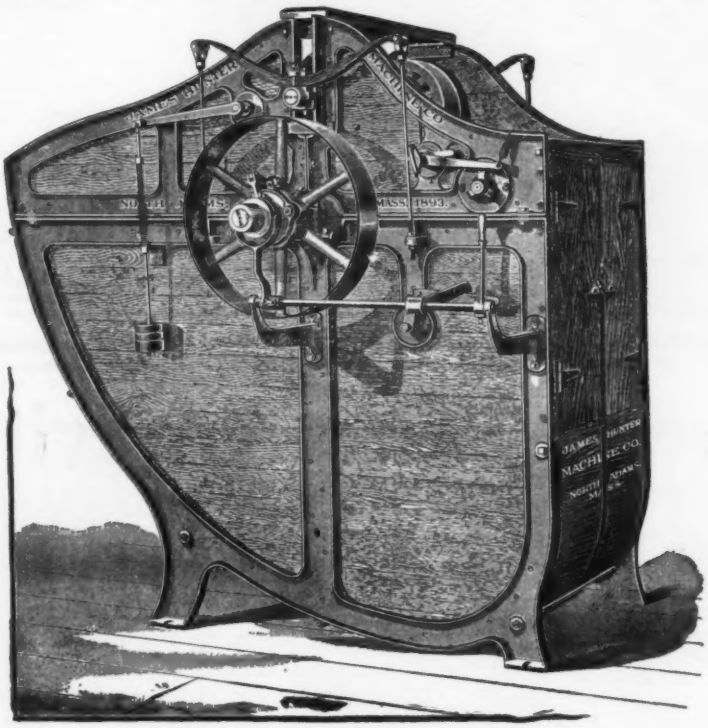
Boston Office,
70 KILBY STREET,
Telephone No. 1522.

Main Office and Works,
ORANGE, MASS.

Automatic Wool Washers

PARALLEL RAKE

The "STONE DRYER," for Wool, Cotton, Rags, Etc.
CARBONIZING MACHINERY, ETC.

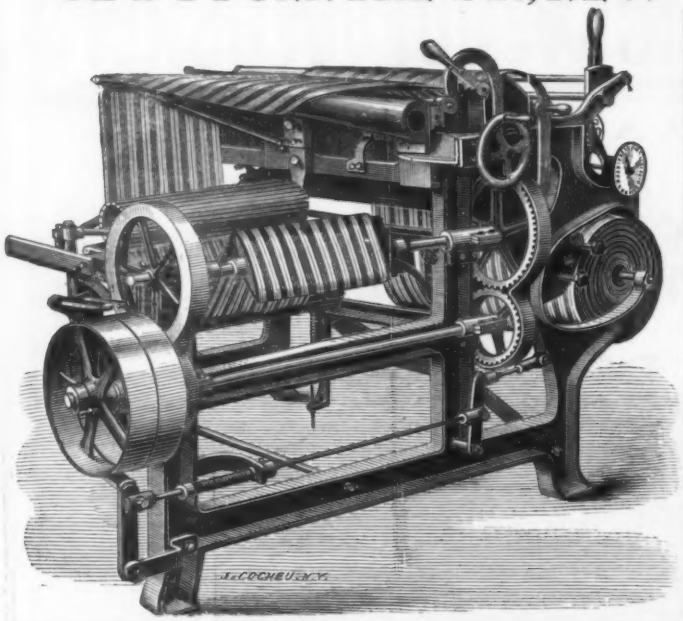


Fulling Mills, Cloth Washers,
WOOL OPENERS, SELF FEEDS, DUSTERS

JAMES HUNTER MACHINE COMPANY, NORTH ADAMS, MASS.

Fabric Measuring & Packaging Co.

82 & 84 CENTRE ST., NEW YORK, U.S.A.



Machines to Print Trademarks

On Cottons, Woolens and Carpets.

Machines to Measure

and imprint the measurement upon fabrics, fold lengthwise and roll into merchantable packages all in one operation.

Prevents claims for short measure.
Marks piece numbers on each package.

A Fully Equipped Machine Shop for General Work.

Patented in the United States and Foreign Countries.

SEND FOR BOOKLET.

The American

WROUGHT STEEL

PULLEY

Is a parting PULLEY and can be applied without stripping the shaft.
It is Light, STRONG, and lasts a lifetime.
It clamps to the shaft perfectly — keys and set-screws superfluous.
Interchangeable metal Bushings to fit shafts of different sizes.
Particularly adapted to TEXTILE manufacturing.

Sold by the Leading Supply Houses all over the WORLD.

The American Pulley Co.,

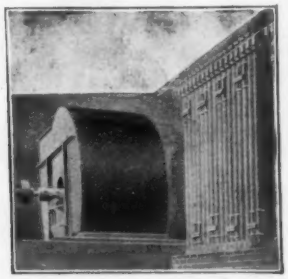
29th and Bristol Streets, : : PHILADELPHIA, PA.

GREEN'S ECONOMIZER

WE BUILD AND INSTALL MECHANICAL DRAFT PLANTS

Keeps a great volume of water always in reserve at the evaporative point ready for immediate delivery to the boilers or other emergencies.

SEE THE POINT?



INCREASES Boiler Capacity 20 to 40%

SAVES 10 to 20% in Fuel

Designed for high or low pressure.
Natural or mechanical draft.
For other advantages, see our catalog.

FANS
BLOWERS
EXHAUSTERS
PRESSURE BLOWERS
ETC.

THE GREEN FUEL ECONOMIZER CO.,
MATTEAWAN, N. Y.

GREEN'S ECONOMIZER

THE JACKSON BELT-LACER.

ITS WORK.

A 5" Belt — less than 3 minutes.

The Cost — One Cent.

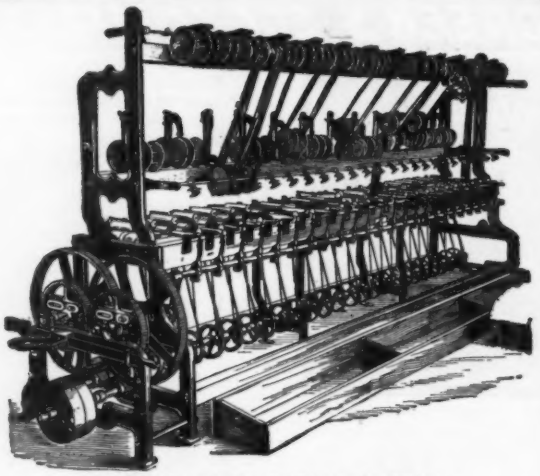
Larger Belts in Proportion.

Catalog.

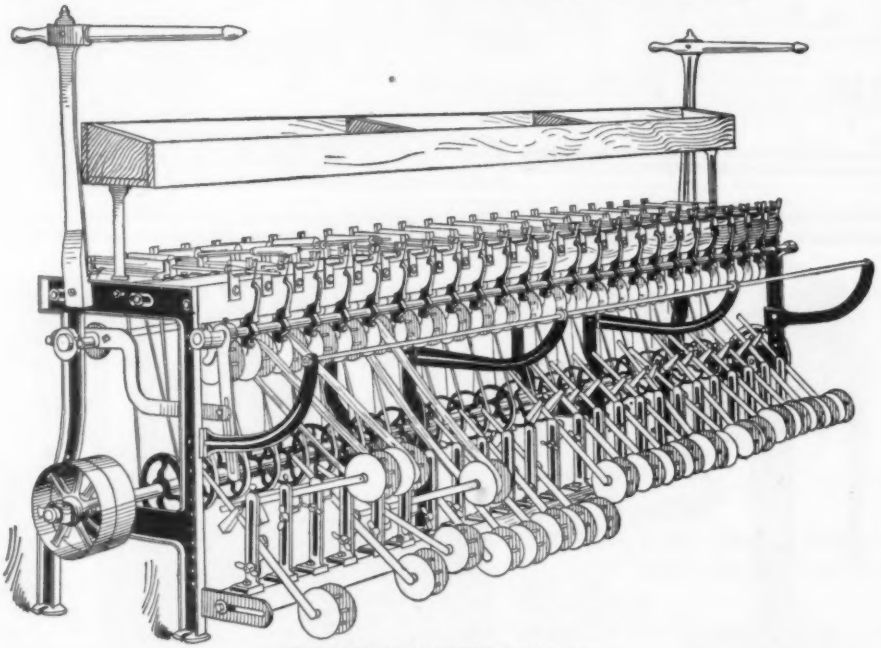
BIRDSBORO STEEL FOUNDRY & MACHINE CO.,
Formerly the DIAMOND DRILL & MACHINE CO.
Birdsboro, Pa. and 52 Broadway, New York.

Agents: E. A. Kinsey & Co., Cincinnati, O.; Charles F. Belsey & Co., Chicago, Ill.; W. R. Colcord Machy Co., St. Louis, Mo. Foreign Agents: Selig, Sonnenthal & Co., 85 Queen Victoria St., London, Eng.; Wilh. Sonnenson & Co., Malmo, Sweden; Jean Braun, Moscow, Russia; Teodoro Koelliker, Milan, Italy; J. Lambercier & Co., Geneva, Switzerland: R. S. Stockivis & Son, Rotterdam, Holland.

SPOOLING, WINDING, WARPING AND BEAMING MACHINERY



Patent Shuttle Bobbin Winder for Skeins, with Patent Variable Motion.



Patent Butt and Cop Winding Machine.

JACOB K. ALTEMUS,

2818 North 4th Street, PHILADELPHIA, PA.

FULL PARTICULARS ON APPLICATION.

DINSMORE

Mill Sewing Machines

No. 9—Portable Foot-Power Rotary Sewing Machine.

It is especially adapted for use in Cotton and Woollen Mills, Bleacheries, Print Works at the Printing Machines, in Dye Works, Cloth Rooms, at the Fulling Mill, Shears, Calendars, Gigs, Drying Machines, etc., or any of the different finishing processes in textile mills.

Manufactured by the

DINSMORE MANUFACTURING CO.,
Salem, Mass., U. S. A.

FIRST CLASS MILLS USE

LOWELL CRAYONS

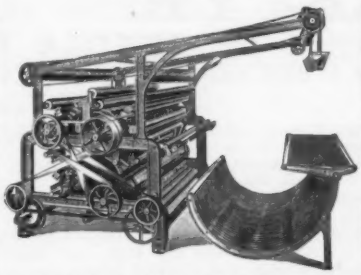
WHY?

They are Worth their Cost.

Will you try our Samples?

LOWELL CRAYON CO., LOWELL, MASS., Original Manufactur'rs

FOUR CYLINDER MACHINE



For
POLISHING
PUMICING
SANDING
BRUSHING

Double Output
Same Cost

PARKS & WOOLSON MACHINE CO
SPRINGFIELD VERMONT

North Chelmsford Machine & Supply Co.

Successors to Silver & Gay Co., Est. 1832.
Successors to No. Chelmsford Supply Co., 1897.

MANUFACTURER OF

Ball Winders, Quillers, Jack Spoolers, Wool Openers, Reels and Special Machines from Drawings or Patterns.

WORSTED MILL SUPPLIES.

Leather Belting, Worsted Aprons, Fallers, Brushes and Comb Circles. Repairing, Covering, Turning, Bossing and Refluting, Drawing and Spinning Rollers a Specialty.

NORTH CHELMSFORD, MASS.

Established 1844.

BENJ. BUCKLEY'S SON,
(WM. J. BUCKLEY) **Gun Mill, Patterson, N. J.**
Manufacturer of all kinds of SPINDLES, FLYERS, RINGS, TUBES, CAPS, etc., for Cotton, Silk, Flax, Woolen and Worsted Machinery.
Roving Spindles and Flyers a Specialty. Light Forgings.
REPAIRING OF ALL KINDS.

Key Seating Attachment

FOR

Whiton Gear Cutter

We offer an attachment for use with our Gear Cutting Machine, to cut key seats for the Woodruff System of Keying. Write for description, circulars and price.

THE D. E. WHITON MACHINE CO.,
19 Oak Street, New London, Conn.

WM. FIRTH, Pres. EDWIN BARNES, Vice-Pres. JOHN H. NELSON, Treas.

WILLIAM FIRTH CO.

Post Office Square Building, 79 Milk Street, BOSTON, MASS.

. . . SOLE IMPORTERS OF . . .

ASA LEES & CO., Limited,

TEXTILE MACHINERY,

OF EVERY DESCRIPTION FOR COTTON, WOOLEN AND WORSTED.

SOLE AGENTS FOR

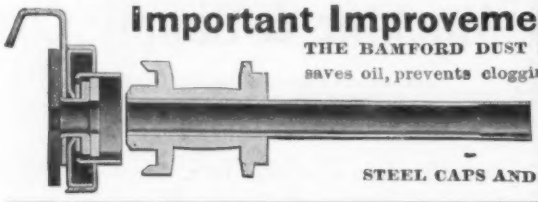
JOSEPH STUBBS, Gassing, Winding and Reeling Machinery for Cotton, Worsted and Silk.
GEO. HATTERSLEY & SONS, LTD. Makers of Every Description of Looms, etc.
JAMES MACKIE & SONS, LTD., Makers of Flax, Tow, Hemp and Jute Preparing and Spinning Machinery.
GEORGE ORME & CO'S Patent Hank Indicators, etc.
JAMES YATES & SON, Hardened and Tempered Steel Card Clothing for Woolen and Worsted Cards.
LOCKETT, CROSSLAND & CO., Engravers and Builders of Leather Embossing Machinery, etc., etc.
R. CENTNER FILS, Heddles.
GOODBRAND & CO., Yarn Testing Machinery, Wrap Reels, etc.
JOSHUA KERSHAW & SON, Roller Skins, etc.
GEORGE SMITH, Doffer Combs, etc.
BRADFORD STEEL PIN CO., Comber Pins.
CLAPHAM, SMITH & CO., Caps, Tubes and Spindles for Worsted, etc.

ALSO AGENTS FOR

JOSEPH SYKES BROS., Hardened and Tempered Steel Card Clothing for Cotton.
WILLIAM TATHAM & CO., Waste Machinery.
DRONSFIELD BROS., Limited, Emery Wheel Grinders, Emery Fillet and Flat Grinding Machines.
COTTON CORD AND VELVET CUTTING MACHINE CO., Corduroy Cutting Machines, etc.

PICK GLASSES, LEATHER APRONS, PATENT WIRE CHAIN APRONS.

Important Improvement in Worsted Spinning.



THE BAMFORD DUST PROOF and SELF-LUBRICATING SPINDLE TUBE saves oil, prevents clogging with dust and lint, thereby insuring longer life to the tubes, saves labor, maintains uniform speed, and most important of all, makes PERFECT YARN. Refer to largest worsted mills.

BAMFORD & SMITH, Pascoag, R. I.

STEEL CAPS AND SPINDLES. ALSO MFRS. OF Caps, Flyers, Tubes, etc., Repaired.

The Prevention of Filling Waste

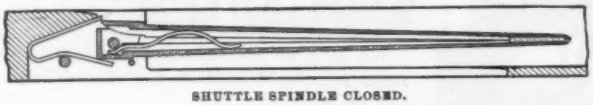
is assured by using the

NEVER SLIP COP SPINDLE

PREVENTS BROKEN COPS, SMASHES, WASTE, IMPERFECT GOODS AND ALL THE SHUTTLE TROUBLES WITH COP FILLING . . .

The illustrations explain this simple device:—
The spindle is split from the bottom to a point a short distance from the end. When in position to receive the cop, the spindle is of such a size that the cop can practically be dropped over it.
When the spindle is lowered into the shuttle the two parts forming the base are expanded holding the cop firmly in place. The pressure is sufficient to hold the cop on a smooth spindle but the corrugations at the base of the spindle hold the cop still more securely.
The spindle contracts when again raised and the empty cop is easily removed.

SHUTTLE SPINDLE OPEN.



SHUTTLE SPINDLE CLOSED.

NEVER SLIP COP SPINDLE CO., - - - 415 Broadway, New York.

FACTS
PERTAINING TO AIR-MOISTENING

For 16 years our System of Air-Moistening has been practically installed in the mills of this country. We are to-day the largest manufacturers of **Humidifiers** in the **world.** Our system has received the **highest awards** in this country and Europe—eight gold medals and others—

Receiving the **highest award** on recommendation of the FRANKLIN INSTITUTE for

"SIMPLICITY AND ORIGINALITY OF DESIGN"

THE ONLY SYSTEM ADOPTED IN THE TEXTILE SCHOOLS

COSTS LESS TO OPERATE Than any other System on the market. Has given satisfaction where other devices have failed.

OVER 50,000 of our HUMIDIFIERS in operation

Adopted by mills in this country representing over 17,600,000 spindles and more than 460,000 looms.

We can furnish hundreds of testimonials from the representative manufacturers of

COTTON, WORSTED, SILK AND FLAX

Making a Speciality of Humidification, we are prepared to advise as to the best introduction and arrangement of a Moistening System. Our facilities for manufacturing and method of installation enable us to quote the lowest prices consistent with the high standard maintained in all details of our equipment. No pains spared to bring every equipment up to the highest point of efficiency, the desired results being carefully considered in all departments requiring special attention. **The following is a list of orders received during the last 12 months:—**

Dennison Mfg. Co., South Framingham, Mass. (repeat order)
A. J. Cameron & Co., Frankford Jct., Pa.
Thos. Kent Mfg. Co., Clifton Heights, Pa. (repeat order)
Lowe Mfg. Co., Huntsville, Ala. (repeat order)
Buffalo Cotton Mills, Union, S. C. (repeat order)
Brighton Mills, Passaic, N. J.
The Yewdall & Jones Co., Philadelphia, Pa.
Saxony Worsted Mills, Newton, Mass. (repeat order)
Aragon Mills, Aragon, Ga. (repeat order)
Atlantic & Gulf Mills, Quitman, Ga. (repeat order)
Pine Tree Silk Mills Co., Philadelphia, Pa. (repeat order)
Williamston Cotton Mills, Williamston, S. C.
Blackstone Mfg. Co., Smithfield, R. I. (repeat order)
Cliffside Mills, Cliffside, N. C.
Dixie Cotton Mills, La Grange, Ga.
Botany Worsted Mills, Passaic, N. J. (repeat order)
Amory Mfg. Co., Manchester, N. H. (repeat order)
Edwards Mfg. Co., Augusta, Maine.
Patchogue Mfg. Co., Patchogue, L. I.
Beaumont Mfg. Co., Spartanburg, S. C.
Victor Mfg. Co., Greers, S. C. (repeat order)
Pocasset Worsted Co., Providence, R. I. (repeat order)
Hamlet Textile Company, Woonsocket, R. I. (repeat order)
Knoxville Cotton Mills, Knoxville, Tenn. (repeat order)
Lud ow Mfg. Asso., Ludlow, Mass. (repeat order)
Capital City Mills, Columbia, S. C., (repeat order)
Pemberton Mills, Lawrence, Mass. (repeat order)
Goodall Worsted Co., Sanford, Maine (repeat order)
W. A. Slater Mills, Jewett City, Conn. (repeat order)
Merion Worsted Mills, West Conshohocken, Pa. (repeat order)
Wauregan Company, Wauregan, Conn.
Mass. Cotton Mills, Lowell, Mass. (repeat order)
Phenix Silk Mfg. Company, Allentown, Pa.
Abbott Alkaloidal Company, Chicago, Ill.
Oscar Heineman, Chicago, Ill.
The Delph Spinning Co., Philadelphia, Pa (repeat order)
Androscoggin Mills, Lewiston, Maine (repeat order)
Steere Worsted Mills, Providence, R. I. (repeat order)
North Adams Mfg. Co., North Adams, Mass.
The Erben, Harding Co., Philadelphia, Pa. (repeat order)
The New York Mills, New York Mills, N. Y. (repeat order)
Magnolia Cotton Mills, Magnolia, Miss. repeat order)
Hess, Goldsmith & Co., Wilkesbarre, Pa.
The Jno. E. mith Mfg. Co., Thomson, Ga.
Gate City Cotton Mills, Atlanta, Ga. (repeat order)
Hope Worsted Mills, Louisville, Ky. (repeat order)
Winship, Bolt & Co., Wakefield. Mass. (repeat order)
M. Swift & Sons, Hartford, Conn.
Pelzer M g. Co., Pelzer, S. C. (repeat order)
Meyercord Company, Chicago, Ill. (repeat order)
Alfred Dolge Mfg. Co., Dolgeville, Cal.
Darlington Mfg. Co. Darlington, S. C. (repeat order)
Saxony Worsted Mills, Newton, Mass. (repeat order)
Luther Mfg Company, Fall River, Mass.
Parkhill Mfg. Co., Fitchburg, Mass., (repeat order)
The J. R. Montgomery Co., Windsor Locks, Conn. (repeat order)
The Bates Mfg. Co., Lewiston, Maine (repeat order)
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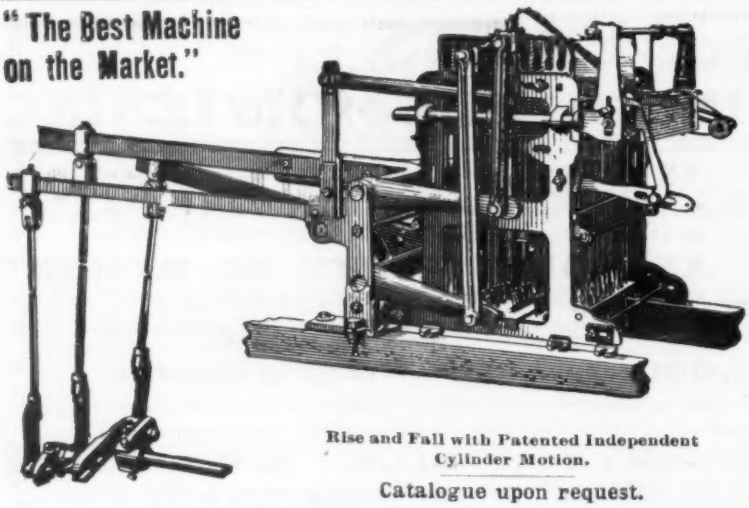

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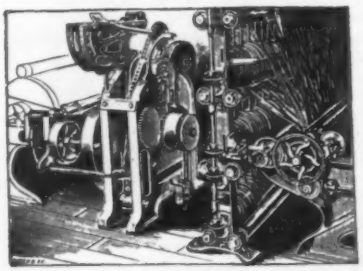

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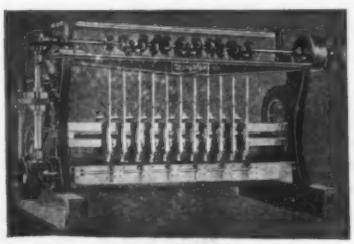

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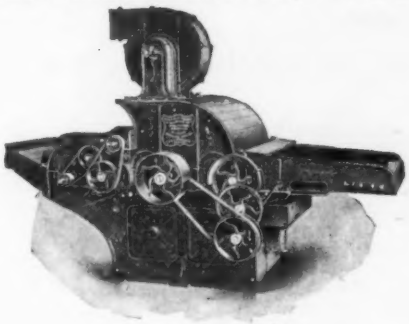

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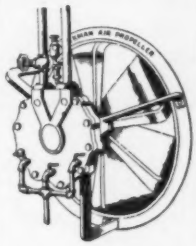

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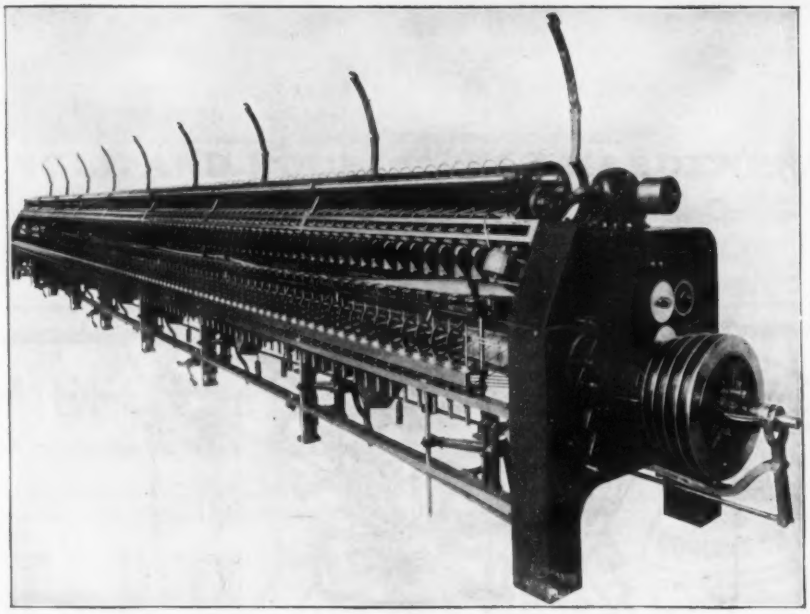

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N. B.—In the article descriptive of the Breese Spinning Frame, which appears on page 163 of this issue, the company's name is erroneously mentioned as the New Process Spinning Machine Co. The correct name of the builders is as above.

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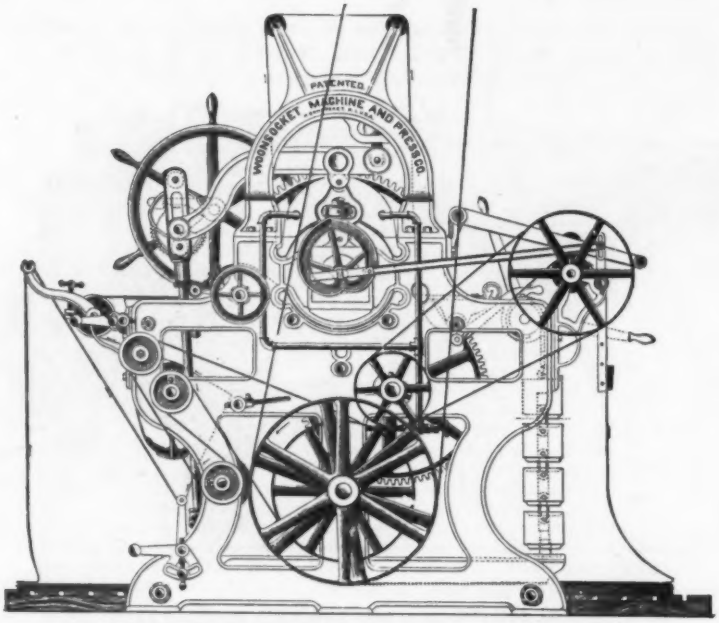

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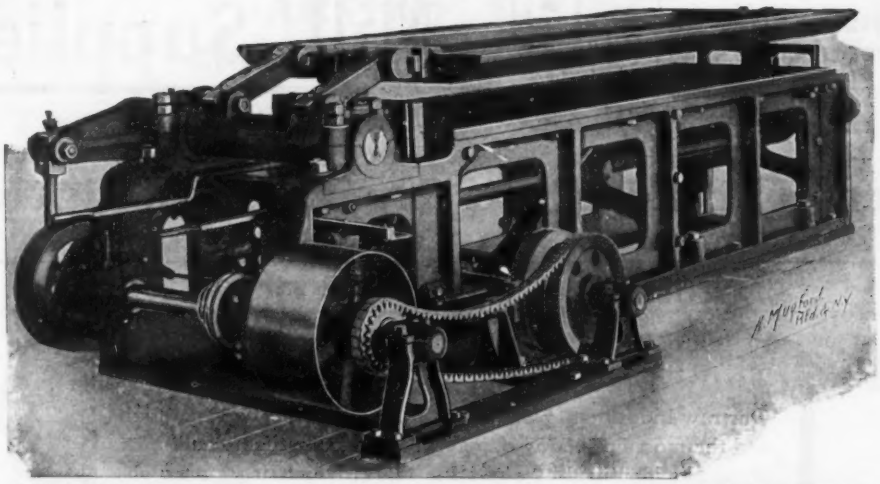

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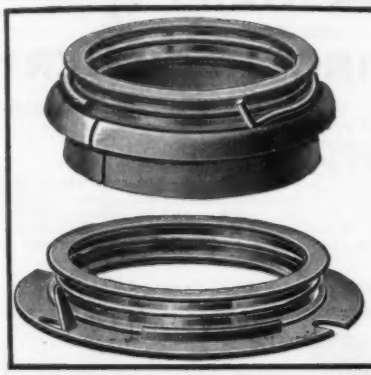

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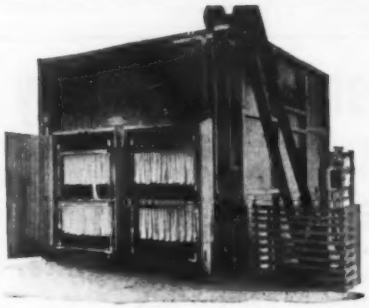

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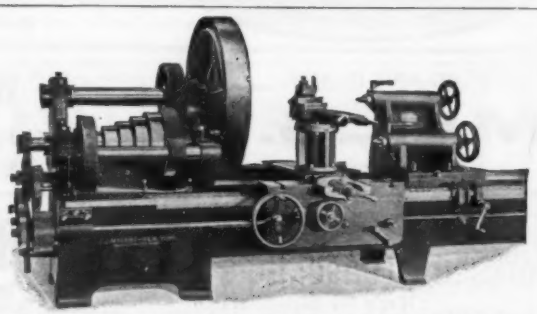

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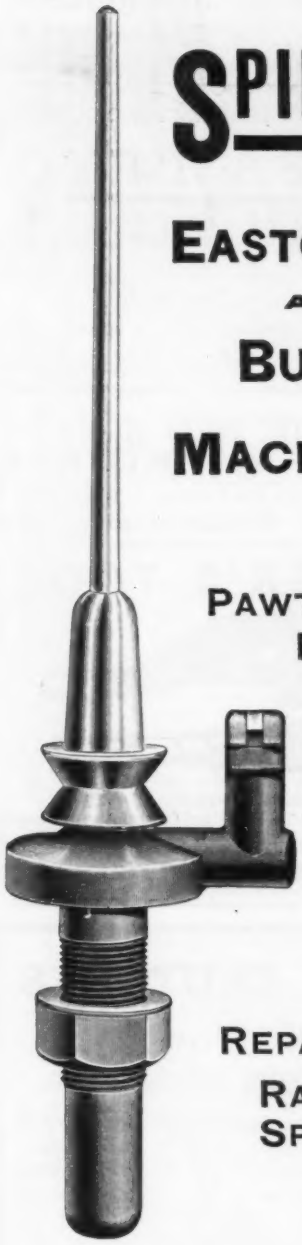

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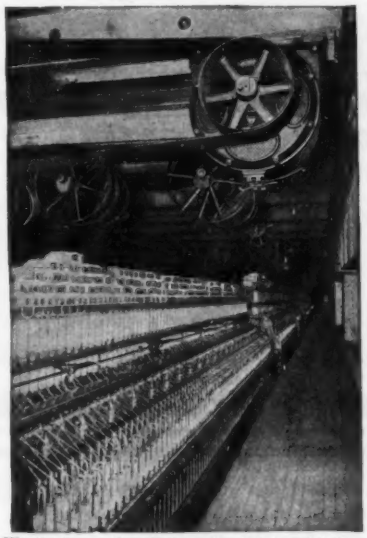

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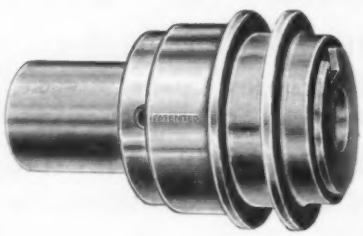

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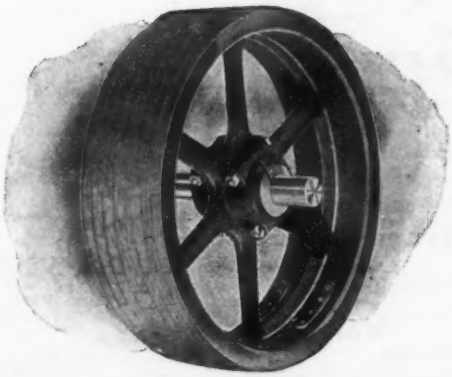

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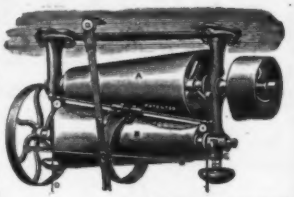

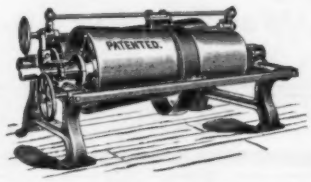

Smith & Winchester Co., So. Windham, Conn., 250 sets. Furguson & McRae, Belfast, Ireland, 25 sets. Mercantile Laundry, So. Windham, Conn., 250 sets. Washburn & Moen, Worcester, Mass., large number, all sizes. Dennison Tag Co., Boston, Mass., large number, small sizes. Saco & Pettee Machine Co., Newton, Mass., 275 sets. Pacific Mills, Lawrence, Mass., 13 sets.

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Cost of using Albany Grease

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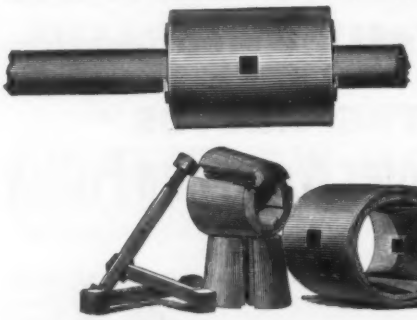

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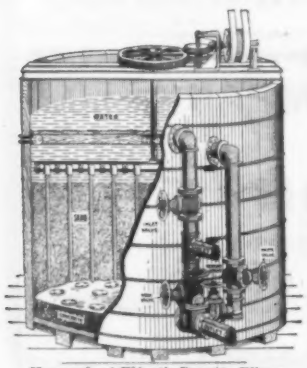

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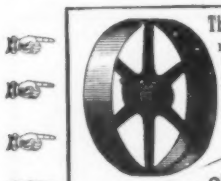

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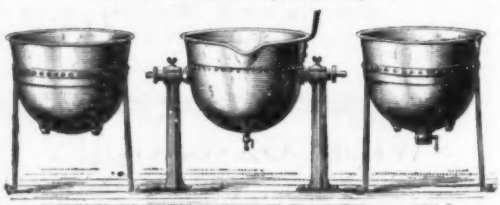

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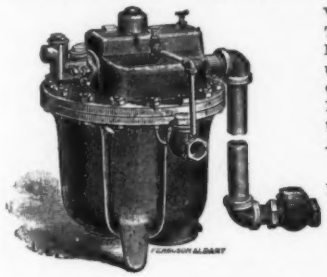

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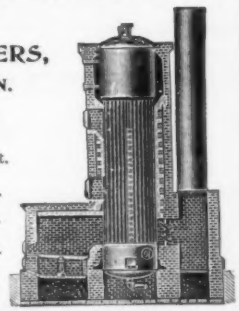

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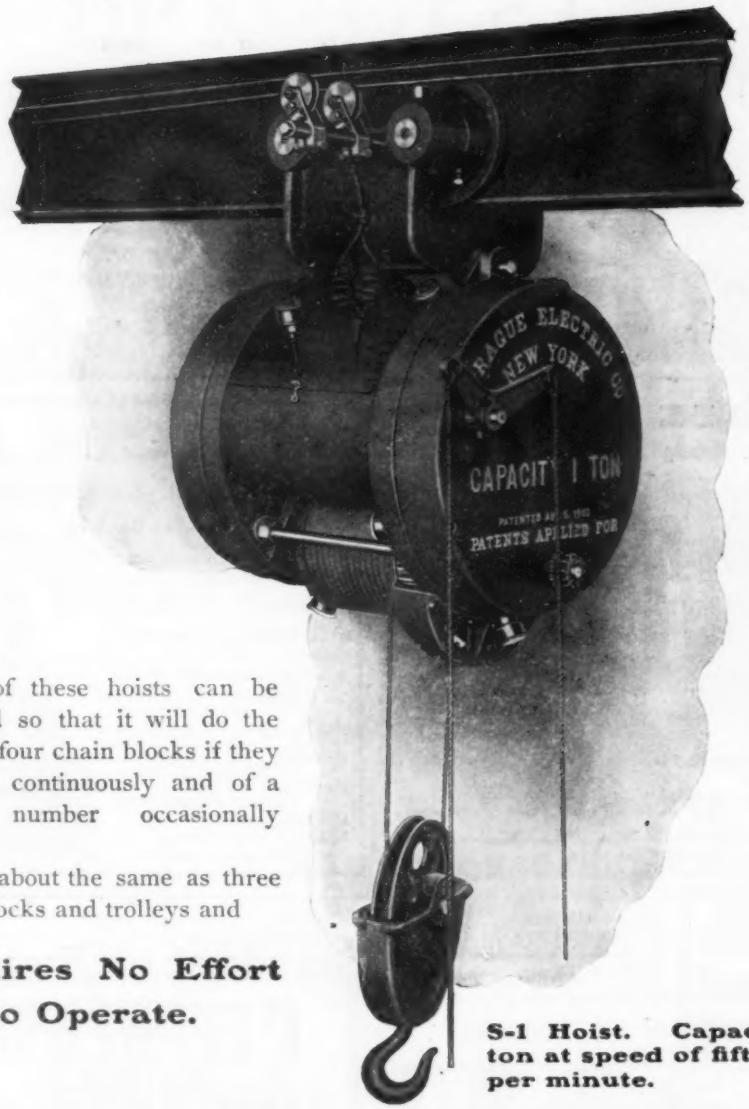

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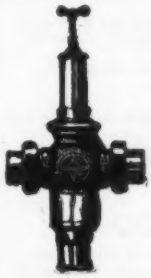

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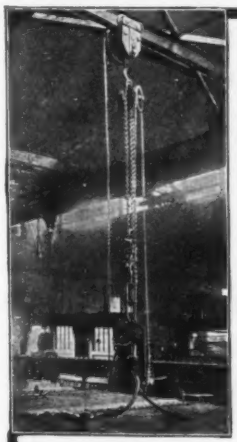

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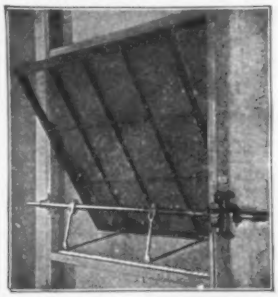

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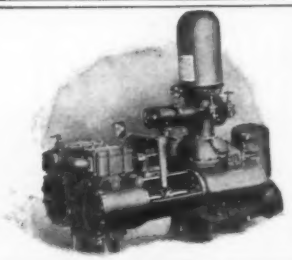

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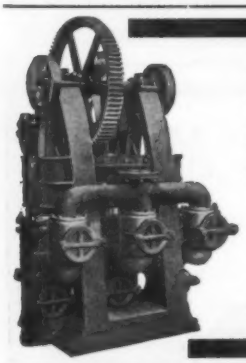

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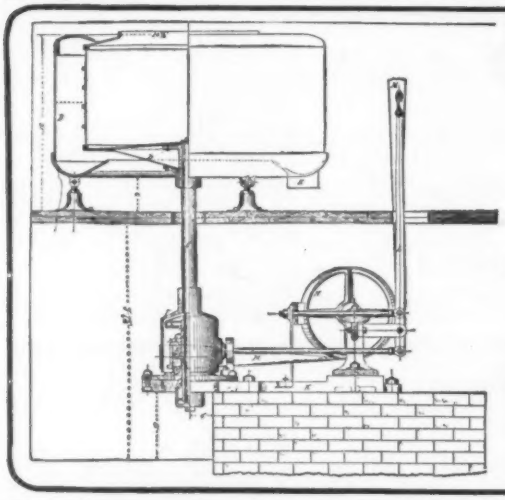

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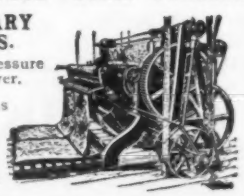

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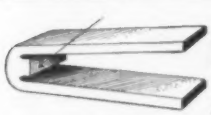

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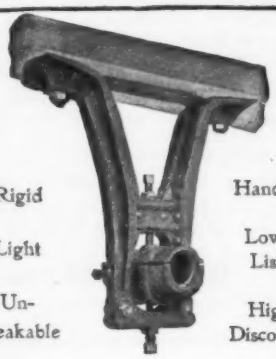

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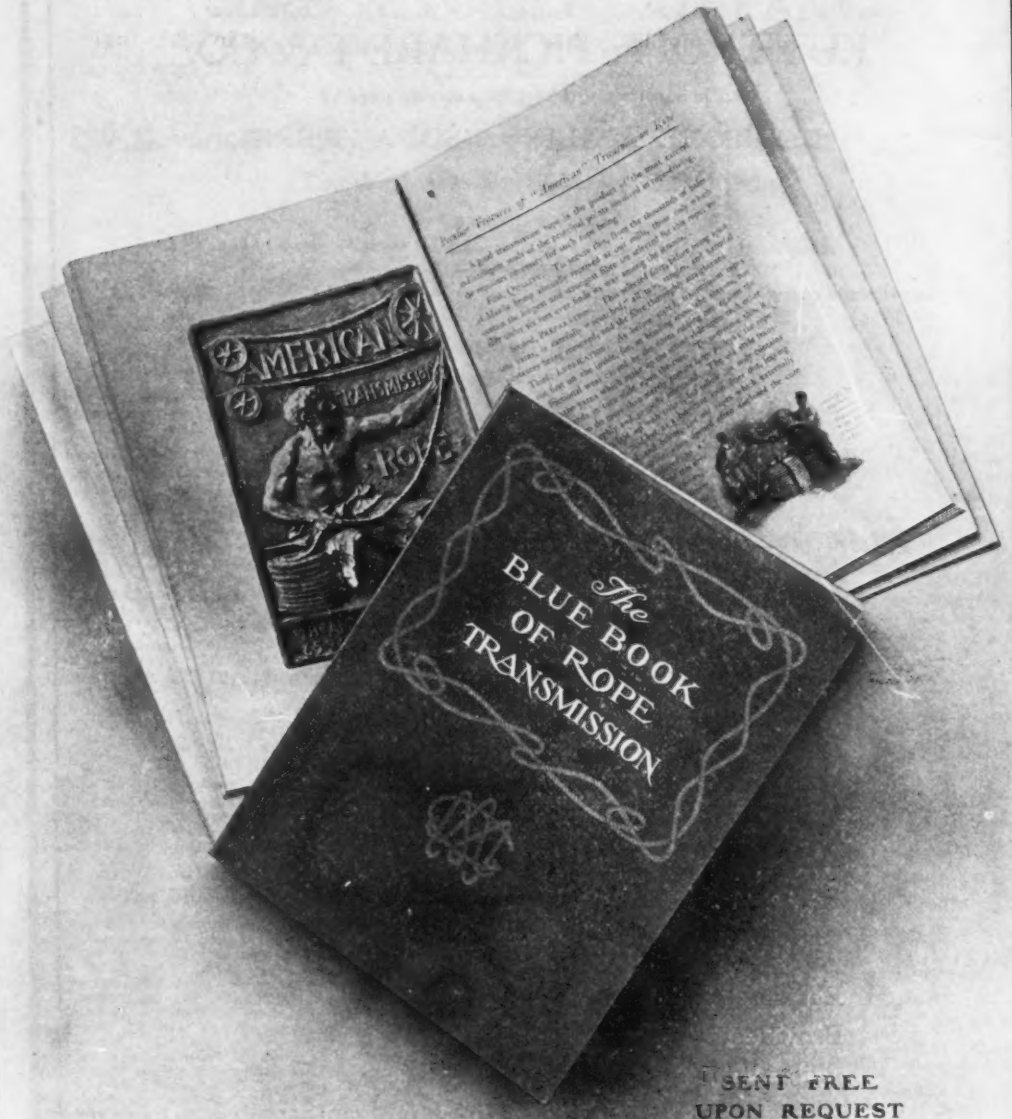

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MAIN OFFICES:

299 Devonshire St., Cor. Summer St., Boston, Publication and Editorial Offices.

425 Walnut Street, Philadelphia.

BRANCH OFFICES:

123 Liberty St., New York. 115 Dearborn St., Chicago.

Entered at the Boston Post Office as Second-Class Mail Matter.

SAMUEL S. DALE, Editor. E. A. POSSELT, Editor Process Department.

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There are 22 textile maps; gives population of town and railroad connections.

PART II. Is the Yarn Trade Index, containing classified lists of yarn spinners, arranged according to kind of yarn, size and number spun, etc. All the mills with worsted machinery are included in this section.

PART III. Contains classified list of mills doing order and commission work, also dyeing, finishing, bleaching and printing establishments, classified according to the kind of work done, and so far as possible giving width of goods handled; also shoddy, extract and flock manufacturers and wool scouring establishments.

PART IV. Manufacturer's Selling Agents and Dry Goods Commission Merchants, giving the name and address of concern, character of goods handled, different departments, with managers, list of manufacturing clothiers, and suit and cloak manufacturers, giving specialties and buyers names. A list of city offices of textile mills is given.

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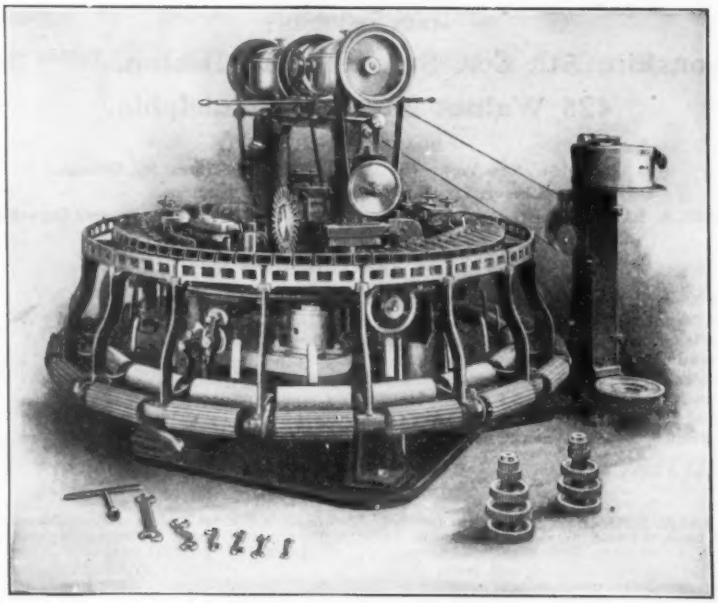

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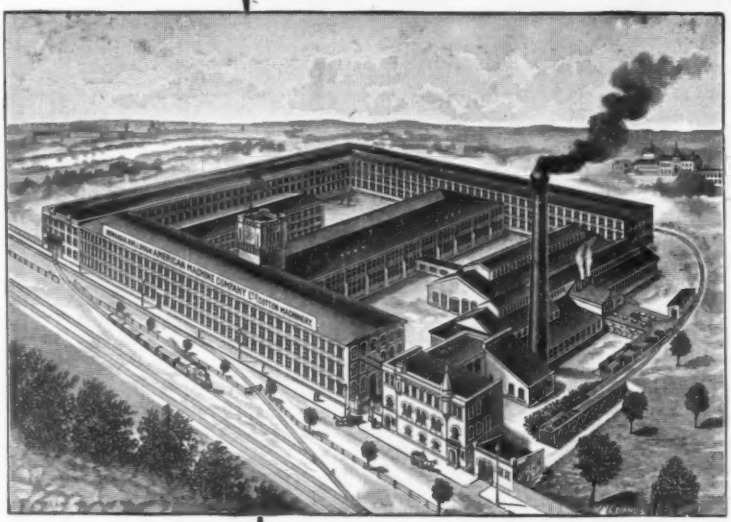

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Monthly Comment.

The New Philippine Tariff on Cotton Goods.

The new tariff on imports into the Philippines went into effect on May 2, and even before that date American exporters had discovered that the new classification of cotton fabrics would have unexpected effects on the duties imposed on certain standard grades of American goods.

The cotton goods included in paragraph 117 of the old law were described as follows:

117. Textiles plain and without figures, napped or not, weighing 10 kilograms or more per 100 square metres (18 pounds per 100 square yards), unbleached, bleached, or dyed, and

Textiles plain and without figures, stamped or printed, napped or not, measuring not over 65 centimetres (25 1/2 inches) in width, weighing 8 kilograms or more per 100 square metres (15 pounds per 100 square yards), and

Textiles plain and without figures, not stamped or printed, whatever be their width, weighing 8 kilograms or more per 100 square metres (15 pounds per 100 square yards).

The only change in this description made by the new law was the substitution of 100 centimeters (39 3/8 inches) for 65 centimeters (25 1/2 inches) as the limit of width. Under the old law prints wider than 25 1/2 inches were excluded from paragragh 117 and a higher duty was assessed on them. The new law permits the wider prints up to 39 3/8 inches to come under the lower duties of this paragraph.

Under the old law large quantities of English prints were woven in two or three widths with center selvages printed on wide printing machines and split after finishing to bring the width below 25 1/2 inches and thus bring the goods under the low rate of paragraph 117. To do this it was necessary to weave the goods in wide looms and print them on wide printing machines, which means a reduction in the cost of manufacturing was effected. English mills and print works are well equipped to make goods this way and have the advantage of a large market in their colonies and all parts of the world, which enables them to produce and market these splits in large quantities at a very low cost.

In the United States there is very little demand for splits the goods being sold in the full width as woven and with a true selvage at each side. As the American export trade is comparatively small, American mills find it impracticable to instal the special equipment for the manufacture of splits, and, consequently, the English mills possess a great advantage in the exporting of prints to the Philippines.

The increase in the width limit to 39 3/8 inches would not, of course, affect the importation of the narrow goods, but it is expected by many in the trade that the War Department will define the term "width" to mean the distance between true selvages as has recently been done in Cuba, and thus exclude the English splits from the benefits of the low rates of paragraph 117. Until this is

done English splits will come in under that paragraph. The uncertainty as to the decision defining width may, however, cause English exporters to restrict their business on this class of goods.

The clause in the new law raising the width limit to 39 3/8 inches admits into the Philippines at the low rates of paragraph 117 wide prints of which American mills make large quantities for the domestic trade and which formerly came under another paragraph of the Philippine tariff at much higher and practically prohibitive rates. Unfortunately, however, the advantages of lower duties on wide American prints afforded by the increase of the width limit to 39 3/8 inches is apparently offset by a change in the classification based on the "set" or threads per inch.

The following table shows the old and the new classification under paragraph 117, the rates of duty being the same in both the old and the new act:

Duty per kilo.	Warp and filling threads per inch. Old law.	New law.
(a) 10 cents	up to 76	up to 76
(b) 14 cents	77 to 127	77 to 105
(c) 18 cents	128 to 160	106 to 160
(d) 28 cents	161 or more	161 or more

(e) 30 per cent. surtax if printed or manufactured with dyed yarns.

American prints are made in a wide variety of "sets." but the bulk of the business consists of three standard grades, namely: 64 by 64, 64 by 60, and 56 by 56. Counting both warp and filling as in the tariff act these three grades are as follows

$64 \times 64 = 128$ threads.
$64 \times 60 = 124$ threads.
$56 \times 56 = 112$ threads.

Comparing these "sets" with the old classification it will be seen that the two lower grades (64 by 60 and 56 by 56) came easily into class (b) at 14 cents per kilo under the old law, while the 64 by 64 set came within one thread of it, and in practice the goods ran so that the 64 by 64 grade was also included in the same class (b). The new law, however, lowered the limit of class (b) to 105 threads per inch and thus transferred all three of these standard grades to class (c) with a duty of 18 cents per kilo. The difference between the two rates amounts to about 1/4 cent per square yard or $6.00 per case, and is therefore of considerable importance. The law, of course, applies equally to goods from all countries and at first sight it seems as if the change of classification could not cause any discrimination between exporters from different countries. The difference in manufacturing conditions between Lancashire and the United States is, however, an important factor in the problem. Many exporters believe that the increase in the duty will divert the business to lower grades on which the English manufacturers will have the advantage owing to their superior facilities in the manufacture and marketing of low grade goods. Others, however, profess to believe that the change in classification will have a beneficial effect on American exports. As the law cannot be changed until Congress meets it is certain to receive a trial of at least six months, possibly more, and it is useless to speculate now as to its probable effect.

There is one lesson, however, that may be learned from the developments thus far, namely, that proposed legislation affecting textile interests should be subjected to the closest scrutiny by the textile trade. The recent revision of the Philippine tariff was nominally made by Congress, but the work of framing the schedules was left to the officials of the War Department. After the act had been drafted copies of the old law and the proposed revision, arranged in parallel, were distributed to a large number of people throughout the country with a request for criticisms and suggestions to be submitted within a period of a few weeks. The pamphlet giving the old and the new schedules, and the request for suggestions, were in circular form and rather perfunctory. If the request caught the attention of the recipient he would be likely to conclude that the time allowed was not enough to enable him to qualify as a Philippine tariff expert, especially as the weights and measures of the schedule were given in standards to which he was a stranger.

As a result of these conditions the officials of the War Department, having no expert knowledge of textiles, blindly adopted poor suggestions and rejected good ones with equal facility. Only one suggestion regarding the "set" classification of paragraph 117

was received. This came from an exporter and involved the change already mentioned raising the duty on standard American prints, and was offered and adopted as being to the advantage of American mills.

The War Department presented its handiwork to the House of Representatives four weeks before the close of a crowded session. The Committee on Ways and Means gave one hearing to Secretary Taft and incidentally showed how little the members knew about the subject of the proposed legislation. Three weeks before adjournment the bill went through the House under the rules. The Senate Committee gave a private hearing to Secretary Taft and at an opportune moment the bill was sprung on the Senate and passed under the assurance from its sponsors that it was a very good thing. It reached the President and was signed by him on March 3, with Washington in a hub-bub and gay with color on the eve of inauguration day.

Thus was the present Philippine tariff jammed on to the statute book. A sample of twentieth century legislation by the executive department with congressional sanction. Result: An increase of $6.00 per case in the cost of American prints in the Philippines to the possible profit of Manchester.

President MacColl.

In his address accepting the election as president of the New England Cotton Manufacturers' Association, Mr. MacColl made a number of practical suggestions that augur well for his administration. Every one of them deserves the careful consideration of the association. Heretofore the papers read at the meetings have been confined closely to technical subjects, to the exclusion of many questions of importance to the cotton industry.

Among the subjects which the new president suggests might be admitted with advantage are legislation affecting the hours of labor, the employment of children, the tariff on textiles, and other political and social problems. That proposed legislation affecting the textile industry should be subjected to the scrutiny and criticism of practical mill men is receiving continuous confirmation. Only a few days before President MacColl offered his suggestions, the cotton trade had awakened to the fact that the Philippine tariff act passed in the closing days of the last Congress had by a change in classification raised the duty on the most important grades of American prints imported into the Philippines $6.00 per case, and that this change had been made on the suggestion of one New York exporter with the object of promoting the American export trade. Such careless and bungling legislation would be impossible if proposed revisions of textile schedules were publicly discussed at the meetings of such organizations as the New England Cotton Manufacturers' Association, or closely and systematically scrutinized by the officers or committees of such technical organizations. There is probably no subject about which the average legislator, state or national, knows less than he does about textile manufacturing. Cotton, wool, shoddy and other textile fibres, yarn and yarn counts, warp and filling threads per inch, woven and knitted fabrics are unfathomable mysteries to him, and when laws affecting textile interests are proposed and involve technical problems the law maker jumps at the chance to turn the question over to the first man within reach who may be considered competent to pass upon them. If the man proves to be ignorant or personally interested the result is that of the recent Philippine legislation. The remedy for this and many other evils in legislation is publicity and examination of proposed laws by practical textile workers, as proposed by President MacColl.

C. J. H. Woodbury.

The presentation of a fine hall clock and artistic bronze to Secretary Woodbury by the New England Cotton Manufacturers' Association at its recent meeting in Boston was a pleasing feature of more than usual interest. As secretary and treasurer Mr. Woodbury has served the society faithfully, intelligently and tactfully for ten years, during which the membership has increased three fold, while the influence and efficiency of the organiza-

tion has increased in even greater proportion. He deserves the recognition of his services which he has received, and if we judge him and human nature aright, the intrinsic value of the gifts, great as it may be, is in his estimation the merest trifle compared with the expression of the good will and personal appreciation of those with whom he has been so closely associated for a decade. In every occupation, no matter how high or how low, there is nothing more gratifying or stimulating to the faithful servant than judicious applause, and it is seldom that we find one more deserving of applause than the present secretary of the New England Cotton Manufacturers' Association.

Textile Calculations.

In a recent bulletin of the American Chamber of Commerce at Paris, we find an article by Matthew Blair of Glasgow, Scotland, which ends with the following unqualified assertion:

"Every calculation in the textile industry would be vastly simplified by a metric system of weights, measures and yarn counts."

This extraordinary claim, in support of which Mr. Blair offered no evidence whatever, finds no support in the methods of calculating in French and German technical works, and in fact, is in conflict with the known principles of mathematics. If it is true, Mr. Blair is the sole possessor of valuable trade secrets whose disclosure would mean an addition to the sum of human knowledge. The expression, "every calculation in the textile industry," includes a wide range of mathematical problems. It covers that large number of operations by which total values are obtained from quantity and price; for example, wages from time and price per hour; total values from pounds and price per pound; from yards and price per yard; in fact, all of the calculations made by the mill bookkeeper and which are based on the four basic operations of arithmetic. How is any new system to simplify these?

Mr. Blair's claim also covers that large number of complicated mathematical problems relating directly to textile processes and whose solution is not affected by the particular standard of weight or measure used. Nearly every process of textile manufacturing involves a loss in the weight of the material used. This loss and its effect on the cost of the material are to be calculated in such cases as the following:

Ex. A test lot of wool costing 24 cents per pound, weighs 450 pounds in the grease, and 360 pounds after scouring and drying. Find per cent. of shrinkage and cost clean.

How can the substitution of the kilogram for the pound simplify the usual solution of this problem?

The following example illustrates a familiar class of textile problems:

Ex. A mixture of stock for a woolen fabric consists of 20 per cent. cotton at 10 cents, 40 per cent. shoddy at 20 cents, and 40 per cent. wool at 40 cents. The total loss in manufacturing is 22 per cent. Find the average cost per pound of picked stock and of finished cloth.

After Mr. Blair has demonstrated how such calculations can be "vastly simplified" by substituting a standard of French extraction for the English pound, he might make a like demonstration with the following problems:

Ex. A single 40s yarn is shrunk 10 per cent. in length. Find resulting count.

Ex. A single 36s yarn loses 12 per cent. in scouring. Find scoured count.

Ex. Find count of a 3-ply yarn composed of single 60s, 30s and 20s.

Ex. Find count of a 2-ply composed of single 24s and 12s.

Ex. Find the single count to be placed with single 80s, 60s, 30s and 16s to make a 5-ply equal to No. 5 yarn.

Ex. Find the proportion of each single count in a 3-ply composed of 25s, 50s and 100s.

Ex. Find the average count of 30 pounds of yarn consisting of 10 pounds No. 8 and 20 pounds No. 10.

Ex. Find the average count in a 3400-end warp consisting of 2400 ends of 60s and 1000 ends of 40s.

Ex. Find the proportionate weights of 40s and 20s to make the average 34s.

Ex. A fabric is made with 64 ends 16s and 56 picks per inch. Find filling count to make the average 20s for the whole piece.

Ex. A 2/72s has 18 turns per inch. Find the proportionate twist for 2/50s.

Ex. In a cotton mill the weight of lap entering

ing, slubbing, intermediate, roving and spinning frames, 12, 6, 1, 2, 2, 2, respectively; draft at card, railway head, drawing, slubbing intermediate, roving and spinning frames, 100, 4, 10, 5, 6, 5 1/2 and 7 respectively. Find calculated size of spun yarn.

Ex. Find average draft for each machine and total draft for the set in preceding example.

Ex. A cut of kersey cloth was 50 yards long and weighed 28 ounces per yard when woven. When finished it measured 45 1/2 yards and weighed 24 ounces per yard. Find:

1. Shrinkage in length from woven and finished lengths.

2. Shrinkage in weight from woven and finished length and weight.

3. Ounces per finished yard from ounces per woven yard and shrinkage in length and weight.

4. Ounces per woven yard from ounces per finished yard and shrinkage in length and weight.

the card is 4812 1/2 grains per yard; loss in carding 10 per cent.; doublings at railway head, draw-

We could continue the list indefinitely, but these few typical textile problems will give Mr. Blair ample opportunity to prove his statement that:

"Every calculation in the textile industry would be vastly simplified by a metric system of weights and measures and yarn counts."

In the absence of such proof we are left to choose between several suppositions: Mr. Blair may have discovered advantages of the metric system hitherto unsuspected by its inventors and supporters; he may be using inferior methods of calculating with the English system; or, his enthusiasm for the metric system may have clouded his judgment. We are driven to these suppositions because an examination of the latest French and German books on calculations reveals no hint of any such advantages of the metric system. To be sure, all practical French and German works on textile calculations are involved in the Continental chaos of weights and measures in which simple and direct methods are impossible, but one author, Nicholas Reiser, of Aachen, has had the courage to write a book on textile arithmetic based on metric measures only. It is entitled, "Die Betriebs-und Warenkalkulation fuer Textilstoffe." It not only fails to support Mr. Blair's claim, but actually supplies much evidence of the inconvenience of an exclusively decimal system.

Until proof is offered, this claim of simplicity for the metric system will not be accepted by those who are familiar with textile calculations. Nevertheless, Mr. Blair owes it not only to himself but to the general public, either to prove his statements or to withdraw them. Already his Paris article has been eagerly accepted as conclusive by that large number who, possessing no knowledge of textile calculations, are ready to believe anything favorable to the metric system. Of them it may well be said:

"And ne'er did Faith with her smooth bandage bind
Eyes more devoutly willing to be blind."

A heavy responsibility for the spread of error will rest on Mr. Blair unless he proves his remarkable claim for the metric system in textile calculations.

Wool Combing.

Recently there has been much agitation in England regarding the conditions of employment in the wool combing establishments of Bradford. It began some years ago with a series of sensational articles in a Yorkshire newspaper. Although the charges against the wool combing employers were exaggerated, there was evidently considerable foundation for them, enough to bring about a Parliamentary inquiry. According to S. Shaftoe, secretary of the Bradford District Wool Combers' Association, the wool combers work in an atmosphere heated from 85° to 110° F. The working hours are from 61 to 61 3/4 per week for day work, and 12 hours per night, five nights per week, for the night schedule. The engine is kept running constantly through the night and the operatives are compelled to get their food whenever they can find a chance to leave their work for a few minutes at a time. It is said that a man leaving the combing shed in the morning "resembles cooked meat more than a human being."

For these long hours of labor under such conditions the wages range from $4.25 to $5.75 per week. During the rush season it is not unusual for the men of the night shift when leaving work Saturday morning to return at noon and continue on duty till midnight. It is said that frequently the men are ordered to start a few minutes after midnight Sunday and work till 6 o'clock Monday morning.

Textile Education at North Adams.

A course in textile instruction was established by the Young Men's Christian Association of North Adams, Mass., about two years ago. It was a success from the start, meeting the requirements of that large number of textile workers who are unable to attend the regular textile schools. Sixty-nine sessions of the three classes were held, the average attendance at each session being 7 4/10. An advanced class in weave formation was added to the course last winter. The class in mill arithmetic was the largest of the three. The benefits already derived from the textile course are so evident that plans are now being formed to extend it next year.

The Leaven Is Working.

The recent reduction of working time from 11 to 10 hours per day without change of wages in five South Carolina mills controlled by Col. T. C. Duncan, is an event of more than local significance. The following mills are affected:

	Spindles	Looms
Buffalo (S. C.) Cotton Mills..	62,000	1,800
Union (S. C.) Cotton Mills...	93,000	2,300
Seneca (S. C.) Cotton Mills..	17,280	444
Pine Creek Cotton Mills, Camden, S. C.....	19,000	475
Excelsior Knitting Mills, Union, S. C.		

The four cotton mills have a total of 191,280 spindles and 5,019 looms or 6 1/2 per cent. of all the cotton machinery in South Carolina. We have made a careful enquiry as to the circumstances under which the change was brought about and learn that Col. Duncan readily conceded the reduction of time at the request of his operatives. Under the 11-hour schedule the five mills, in common with nearly all the other mills throughout the state, were greatly hampered by a scarcity of help. A large part of the machinery was idle all the time because help could not be obtained to operate it. Production declined and the consequent increase in the cost of manufacturing wiped out the calculated profit. The only remedy was to keep the machinery in operation and thus reduce the cost by increasing the production. This could be done only by securing a full set of hands, and the reduction of working time without change of pay was the means adopted to secure the help. A large part of the help is paid by the piece, and since the reduction of working time both day and piece help are required to attend more closely to their work. Coming in late and going out before closing time are not tolerated and the discipline during working hours has become more strict.

The results of the change have been satisfactory in every respect as might be expected. All the day help and a large majority of the piece hands welcomed the reduction of working time from the start, and those of the piece hands who were inclined to object to the 10-hour day are rapidly becoming supporters of the new schedule after experiencing the practical results.

The mill owner is finding that the reduction of working time means an increase of production, one of the mills writing us as follows:

"The change made in the mills here is a good thing for both mill owner and operative. The same wages are paid for 10 hours as was formerly paid for 11. The piece help are more attentive to their work and the production (of each operative) is about the same. For the month of March we (the mill) got off more work than for some months before. When it becomes known throughout the country that these mills are paying the same wages we shall have the best help in upper Carolina."

This is in line with the experience of every cotton manufacturing country. The mills of New England and Old England were once run 11 hours per day and the reduction to 10 and even 9 hours has been brought about, not by the philanthropic action of employers, but by the increasing demand for labor. This gradual change was for many years accompanied by unwise demands from labor and equally unwise resistance of employers, by disputes and strikes. During all this time, however, the constant tendency has been toward shorter hours and more intensive labor. Several generations have worked out certain conclusions that are now axioms in cotton mill economy. Lengthening the working day beyond a certain limit exhausts the operative physically and mentally, and

thus reduces the product of a day's work. Neither a soldier nor a weaver can be kept on a forced march every day. Fine goods cannot be well made by operatives working long hours. As the product becomes finer the necessity for constant care in doing the work becomes greater. We find that throughout the whole world the grade of cottons is in inverse proportion to the hours worked per day by the men and women who make the goods. The extremes are found in Lancashire where the working day is shortest and cotton goods the finest, and in India where the day is longest and the product the poorest.

Every Southern mill that changes to the 10-hour system will increase the difficulty of operating the other mills on an 11-hour schedule. The change to a 10-hour day in the five Carolina mills is thus important in itself, but still more by reason of its being a part of a natural process by which conditions are to be equalized throughout the whole country. It will be fortunate indeed if this leveling process is accomplished by lifting Southern labor to the Northern level instead of pulling Northern labor down to the Southern level.

Wages of English Weavers.

Coincident with the decline of cotton to an 8-cent level a marked improvement took place in cotton manufacturing abroad. As a result, English mills have for a month been driven to their utmost capacity and have secured contracts for many months to come at prices that show a handsome margin of profit. This activity is due, doubtless, to a scarcity of goods caused by the prolonged curtailment of production while cotton was selling at 10 and 15 cents per pound, and mills were unable to get supplies of the raw material even at those high prices.

The prosperity of the manufacturers has led the operative to demand a share of the benefits and last month at a meeting of the employers and employees of Manchester, an agreement was made that the wages of the weavers should be advanced 5 per cent. beginning with the second Saturday in July. The weavers demanded 7 1/2 per cent., but the question of granting the further 2 1/2 per cent. was postponed until January, 1906.

Compulsory Examination of Steam Boilers.

A bill has been introduced into the Massachusetts legislature providing for the compulsory inspection of the steam boilers in the state by the state police. Its provisions are very stringent and the proposed legislation is unquestionably due to the appalling disaster at Brockton, where one hundred employes in a shoe shop were killed and many injured by the explosion of a boiler and the resulting destruction of the mill buildings.

Human nature is so constituted that only by such accidents are the authorities moved to take the necessary steps for the protection of life and property. As long as no accident occurs carelessness is apt to continue and boilers are placed in charge of men utterly unfit for the duties assigned them. On the other hand legislation enacted when public sentiment is stirred by such a disaster as that at Brockton, is apt to go to the other extreme and impose burdensome conditions upon those who have occasion to operate steam boilers.

Legislators should bear in mind that extremely rigid laws are certain to defeat their own objects. Being impossible of execution the laws are ignored and those in charge of boilers soon forget they exist. There is another feature of the question worthy of attention. It is not only necessary to pass laws for the inspection and control of steam boilers, but it is equally necessary to enforce the laws after they are placed on the statute book.

Knitting Industry on the Pacific Coast.

A number of our correspondents on the Pacific coast have reecntly called our attention to the opportunity for developing the knitting industry in that section of the country. The demand there is particularly for the heavy hosiery which is worn in the Northwest. The consumption is said to be large and knitters now rely on Eastern mills for their supply of yarn. It is said that there is no mill in the Northwest that spins yarn for the knitting trade. This puts the knitters to a serious disadvantage as they are unable to obtain the proper kind of yarn required for their goods, and are also troubled by delay in deliveries from the East.

Seasonable Fabrics.

MEN'S WEAR WOOLENS.

The men's wear district is unusually quiet and the existing conditions are by no means satisfactory to the majority of the selling agents. It is true that there are a number of mills well provided with orders and duplicates and supplemental business have placed others in a comfortable position. It seems clear, however, that the normal volume of heavy weight business is considerably below what it was a year ago, and it is claimed that clothiers have bought only about 75 per cent. of their usual amount. The situation may materially improve during the present month, and the outlook in that direction seems to warrant an improved tone. During the past few days the jobbers have duplicated on certain lines of fancy worsted suitings, to a gratifying degree, and when the clothiers have found out the numbers that have gained popular favor they will lose no time in sending in reorders. It is nevertheless a fact that many mills are sure to be disappointed when the season terminates, more particularly those that have devoted their looms to the construction of low grade mercerized fabrics. It is perfectly evident that the demand for these fabrics has fallen off, and this is not to be wondered at when it is considered that their only merit lies in the fact that the price is low.

Any fabric, whether of this character or any other, is doomed to failure unless it possesses some intrinsic value that appeals to the consumer. During the scramble for business for these so-called mercerized worsteds, they were cheapened to such an extent that their wearing qualities were entirely overlooked in the desire to secure appearance and price. The mills which today are in a comfortable position are those that turn out reputable goods, even if such goods are what may be termed high priced.

There are three fabrics which are not receiving the support predicted earlier in the season, namely, low grade kerseys, rain cloths, and as just stated, the lower grade of fancy worsteds. Fancy overcoatings have thus far not met with the same degree of favor as they did last year, and the vogue for the coming fall season promises to be limited.

For current wear, the demand for serges is beyond the average. Homespuns are considered poor property. This latter is another fabric that has through too much manipulation been run into the ground. In order to stimulate transactions and quicken the apathetic pulse of the trade several novelties have been somewhat tardily introduced, notably the green and semi invisible green tones. Francis H. Holmes selling through L. F. Dommerich is showing a line of green mixed fancy worsteds at prices ranging from $1.05 to $1.85. Herbert Lawton & Co. have opened a line of bottle green worsteds in 19-20 ounce goods at $1.80 and $1.85. W. J. Battery & Co. are showing a line of 20-ounce woolens in green effects at $1.05. What position this shade is going to obtain in the trade, is difficult to predict, but it is not believed that it will prove a dominating factor. This shade has been introduced several times within the past few years, and its course has always proved comparatively short.

The mills of the American Woolen Co. appear to be in an enviable position, and it is claimed that already sufficient orders have been gathered to keep them going through the whole season. Evidence of this, is found in the recent advance on the productions of the Chase, Moosup, Sawyer and Weybosset Mills of 5 cents a yard, and an advance ranging from 2 1/2 cents to 10 cents on all staples of the Washington and Fulton Mills.

DRESS GOODS.

Better results are being realized in the woolen dress goods division of the market than was thought possible shortly after the opening of the fall lines. All indications point to a larger outlet over the retail counter than for several years past. It is an undeniable fact that the cutters have for several seasons made serious inroads into the dress goods departments of the retailers, and an apparent reaction is now being brought about. Both domestic manufacturers as well

as the importers are well pleased with the success of their road men.

The trend of the demand is distinctly in the direction of plain fabrics. Broadcloth is the leading fall fabric; not the heavy goods that have been worn for numberless years but the light weight, fine weave and lustrous finish. Prunellas and drap d'ete will hold an important place in the fall aggregation, with silk warp henriettas and cashmeres rapidly regaining their oldtime favor. Whipcords and poplins are again in the ascendant and seem to be well taken according to the reports of the road men.

Wool batiste, albatross and light weight fabrics on that order are selling well. The Panama weave which has had an unusual run for the past two seasons is not thought quite as good; while voiles and eoliennes which have been the leading fabrics for several seasons are not now considered good property. There are sections of the country where voile is being taken in considerable quantities, but it is claimed by dress goods authorities that voiles, etamines and coliennes are on their last reach. Among the most popular fancies may be classed embroidered overplaid tartans. This is an important fabric sold by M. D. Howells & Co., 46 inches wide at 90 cents a yard. The call for shepherd check mohairs sold by Fred. Butterfield, 46 inches wide at 55 cents, is continuous in black and white, blue and white, brown and white, and green and white. Cream goods both figured and plain in mohairs are very much in request. Cream broadcloths as well as cream French serges are also called for in considerable quantities and the manufacturers find it impossible to keep pace with the demand.

SILKS.

It is very generally conceded that the spring season now coming to an end has been the best in years. The market just now presents a quiet appearance, but the outlook for fall is most encouraging and there is no reason to believe that the most optimistic expectations will not be realized. No concession in price can be obtained even in this mid-season period, and it is safe to predict that quotations will not be lower as the business for the fall season progresses. About the scarcest thing to find for immediate delivery is the small neat taffeta checks. Rough novelty silks in solid colors are also becoming decidedly scarce. Black chiffon taffeta is another silk fabric that the manufacturers are unable to deliver on the time specified.

Copper green, hunters' green, reds and violet are considered the leading shades for next season. Printed warp Roman stripes and printed warp plaids are considered good among the fancies, and embroidered dots on

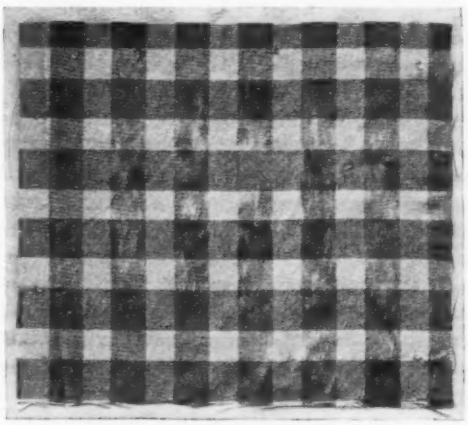


FIG. 1.

shepherd checks similar to Fig. 1, which is sold by Valentine and Bently, 21 inches wide at 90 cents, are meeting with strong support. The outlet for plain colored taffetas continues to be immense. Shot taffetas are also much in request, especially those with black warps, and indications point to a revival of failles and grosgrains. Plaids in new color combinations which have been placed on the market are attracting considerable attention. The colors are artistically combined and the effect is most pleasing to the eye. Small fancies in hair line stripes and neat figures are being taken for prompt shipment and little in the way of surplus stock is to be found anywhere. Japanese habutai, pongees and Shantung silks are particularly strong for current wear.

WASH GOODS.

The bulk of the business for the year 1905 is now in and there appears to be a consider-

able over production. One of the prominent New York jobbing houses announced a sale of desirable goods to the value of over one million dollars, being consignments from several well known mills. The fabrics consist of printed lawns, zephyr ginghams, percales of various qualities, several grades of printed batiste, plain colored lawns, oxfords, mercerized striped dimities, and a large variety of other staple washable fabrics. Whether this means a serious loss to the various mills is problematical as instances are known where such sales have secured fully 90 per cent. of their regular value.

Several manufacturers are making preparations for fall business and bringing out lines other than their regular productions.

The Arnold Print Works, for instance, are sending out samples of several cloths which are close imitations of a linen fabric, under the trademarks of Arnold Linette, Arnold Cromarty Linen, and Arnold Handkerchief Linene. The first has the appearance of a butchers' linen and is suitable for shirt waist suits and other purposes, the second closely resembles linen homespun, while the third can be utilized for waists, suits, and children's dresses.

The same company is also bringing out a fabric which closely resembles wool broadcloth and deserves special mention, the weave and finish being excellent. This fabric is produced in all the dark staple colors, and sold by the jobbers at 17 1/2 cents. Harding, Whitman & Co have met with marked success with their printed fleeced goods, which are sold to the jobbers at 7 1/2 cents less 10 per cent. and 2 1/2 per cent.

WHITE GOODS.

Decided improvement is noted in the white goods market, the request for small designs in jacquard fancies being most pronounced with the result that the market is almost bare.

Swisses both plain and dotted, India linens, victoria lawn and nearly all the staple sheer fabrics that were slow a month ago are now called for in large quantities.

Prints and ginghams show little improvement. Some concessions are obtained on standard clarets owing to the rivalry existing between two prominent manufacturers. The price of indigo standards is considered high by most buyers, and some concession can be reasonably looked for within the near future.

LININGS.

The tone of the market is distinctly better for all classes of goods, while mercerized sateen and percalines furnish the bulk of the transactions. Special finishes of highly lustrous fabrics are being well taken by the trade, and generally speaking the condition existing is very much better than it has been for some time. Prices on the whole are well maintained, although some concession has been obtained on several numbers of silesias. The clothiers are showing active interest in alpacas, mohairs and allied lines suitable for their fall business.

"LONDON SHRUNK."

BY JAMES STRAND.

"London shrinking," which appears to be exciting the interest of American manufacturers of worsteds and woolens, is misunderstood by some writers to the textile press. Indeed those who have been working the process for many generations past would be at a loss to recognize their own methods in certain descriptions given. Be it said that the original "London shrinking" is an addendum to all other processes of manufacture. Cloth fully finished and pressed is delivered by the manufacturers of England and Scotland to the London or other merchants. For their own satisfaction, to obtain the particular handle that they prefer and to make sure that the cloths shall not shrink after leaving the tailor's hands, these merchants employ shrinkers. About a score of firms carry on the business in London and some of these have established branch-works near the mills in Yorkshire. Thus Jennens, Welch & Co. have works in Bradford and Huddersfield. Perrott & Perrott have works in Leeds, but Peerless, Farr and other noted houses confine operations to London. Not all of them pursue identically the same mode of working and some maintain an elaborate appearance of secrecy. But there is no mystery at all as to how the shrinking is done.

The recognized procedure is to fold dry cloth between upper and lower layers of wet cloth, to dry the cloth by natural means and subsequently to give cold hydraulic pressure. Some minor variations are made. A close woven cloth which has been well fulled and shrunk at the mills and comes bone-dry from the hot press is not treated with much moisture. Its enclosing wrappers are not so damp that they do much more than supply the normal regain of 12 1/2 per cent. of moisture that dry wool naturally absorbs. Such a piece is encouraged to shrink but little in width and length. The chief purpose is to be rid of the glaze and the harshness and to substitute a pure, soft handle and a somewhat deader appearance.

To suit some fabrics and some customers, the shrinkers find it necessary to use hot pressing at times. It is certainly the case that the exact procedure is not stereotyped, even at any one shrinker's works. Some fabrics are given a more thorough wetting and are dried by circulation in a specially ventilated chamber. One shrinker is said to replace the use of water by low-pressure steam. When it happens that goods in no need of shrinking are sent, it is rumored that the shrinker's stamp and tickets are placed on pieces that have merely been opened out and cramped in a cold press. But merchants are able, by comparing the dimensions before and after, to see how much the process has done to fill up the cloths. Sometimes the loss of length and width is considerable and at other times quite slight.

The average charge for London shrinking is one penny per pard of 6/4 width or, more precisely, $2.16 per 100 yards. The process has its undoubted uses, though in some quarters it is exalted as a fetish. Certain trade customers insist upon seeing the brand of a particular shrinking house upon the cloths they buy and the good will of some names is not disputed as a valuable asset. The goods subjected to the London processes are the finer sorts of tweeds and worsted coatings, made for sale by private tailors rather than by manufacturing clothiers. Success in the business depends on a nice knowledge of the prejudices of particular buyers and on a sympathetic understanding of the nature of the most varied assortments of cloths. Judging accurately what has been done already the skilful shrinker sets himself to improve the result. And perhaps it is worth saying that an appearance that the manufacturer will actually decline to pass as satisfactory is made to order at the special behest of the merchant who knows what his customers require.

CHEAP YORKSHIRE TWEEDS.

(Specially Written for Textile World Record.)

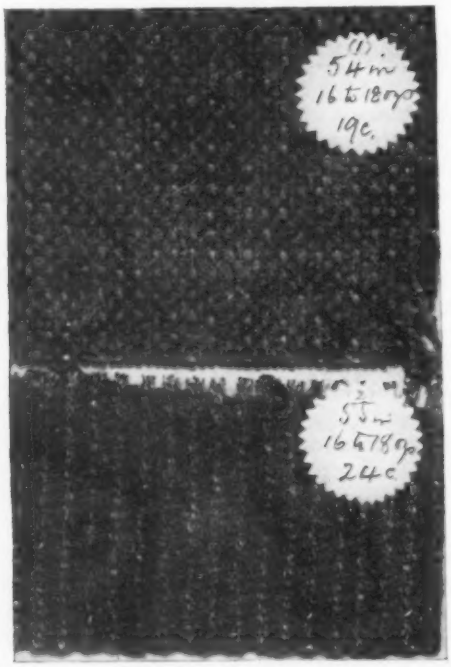
SIX QUARTER CLOTHS AT 19C. PER YARD.

We certainly live in days when, whatever happens, no man need express surprise, but I must acknowledge to being a little nonplused when talking the other day to one of our travelers for a large Leeds wholesale clothier. Although the firm has been in existence for only a few years, it has got a name for doing some "smart" things, and from what I narrate below I think the general reader will admit that what they do not know about cloth buying and suit manufacture is not worth knowing.

After our ordinary salutations our conversation turned upon trade, and as he had just completed a journey and taken many spring repeats, beside opening out a few fresh lines, he hit off the situation by saying that all the rage seemed to be for "something cheap." Agreeing with what he said, I asked him casually what they had that was fresh, and what was selling best. There is no doubt that tweeds continue to be the most popular article on the market. Go where we will checks and stripes of a "cheviot" order are everywhere in vogue. I do not think many seasons will elapse before the everlasting blue serge again becomes popular, for the "upper ten" are now adopting that fabric because the million have taken to wearing the fabrics supported by the "big guns" for the past few seasons. Still, manufacturers have to make that which they can sell best, so while I had my friend on the go I asked him for a few patterns of what were leading lines in his collection.

I was very much taken aback when he said that they were selling largely a tweed, No. 1,

that was costing them no more than 9 1/2d. per yard or 19 cents, 54 inches wide. I must say that the cloth is a marvel of value, and while I have often seen cheap lines, this takes the cake. Think of it, boys' suits being sold wholesale at 3s. 6d. or 84 cents! To look at the cloth and to handle the same only increases one's feeling of surprise. To those wanting something cheap it will fill the bill admirably. It is very sightly, handles well, is of a fair weight and made in a popular color, light gray and black, with a bird's eye ap-



pearance. It is woven plain, the warp being three threads light gray and dark gray twist, and one thread black and white twist, the white really being a dirty color and tending on the light gray side, the weft being all black.

The most surprising thing about this cloth is the component parts of the raw material, and it stands as an example of the ingenuity and resourcefulness of modern manufacture. It is supposed to be and actually passes muster as a woolen cloth, yet it does not contain one ounce of pure wool. Fully 80 per cent. is pure cotton. The warp threads are all cotton twist, and it is this that gives it the broken up, bird's eye effect. Two shades of gray soft spun cotton are twisted together to the thickness of about 2 run. Even the weft, in order to make it weave, is likewise twisted with a small thread of black cotton. Its wearing properties? Well, that is not to be considered. It looks well, is cheap, and that is all that seemingly is asked for.

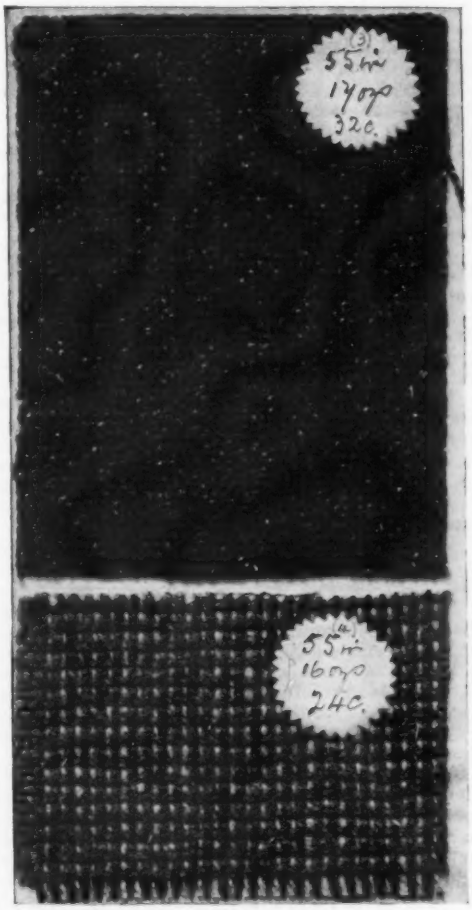
The next cloth, No. 2, is to my mind the most deceptive fabric I ever saw. Anyone who examines the fabric must wonder whatever next. For trouserings and slopping trade purposes it will do admirably, and the way it has been loomed and woven is the secret of success. The warp consists entirely of all black and white small cotton twist. Only 21 threads to the inch are to be found so the warp is going to cost very little. Three ends seem to be slayed, then two dents are missed, and three threads slayed again. In the process of weaving a very thick soft woolen thread is used which fills up the gap, and as the surface of the cloth is not cut very close in finishing, no one suspects that there are no threads between one stripe and the other. I never saw an arrangement like this in my life, and moreover I never suspected it until I came to unravel the pattern. The cloth is a very attractive one for a stripe, and has sold remarkably well for trousering purposes among the poorer classes of the community.

The cloth for a pair of trousers will cost 1s. 3d. (26 cents), they will be cut and made wholesale for another shilling, so it will be possible to secure wholesale a pair of men's trousers anywhere from 2s. 8d. to 2s. 11d., and the same retail for 3s. 6d. to 3s. 11d. (87 to 97 cents).

If any American manufacturers could make a trip to the Boston office of this paper and see this cloth it would pay them many times over, for with a life-long connection with the woolen trade, I must say I have never seen the like of this since I entered the mill. Its appearance and price are the two factors which sell the cloth, and certainly the man who designed it is worthy a word of congratulation.

Our next cloth, No. 3, is a typical Golcar (Huddersfield) tweed, and it is upon such fabrics as this that a large number of Hud-

dersfield mills are very busy. Although the cloth is worth only 16d. (32 cents) per yard, 6/4, still it is very smart, and will sell for those wanting just a cheap summer tweed, and then to be cast to one side. A large number of working men today like a new light evening lounge suit, fit for Saturday afternoons, and these cloths are made expressly for this purpose. A suit will cost no more than about a guinea to 25s. retail, and this suits the pocket of the man on the street.



The fabrication of the cloth is an exercise for the designer and manufacturer, and here again the secret of success lies in the harmonious blending of colors. A good deal of cotton twist is employed to liven the fabric, while an over-check is produced both warp and weft way to increase the brilliance of the pattern. All the materials are composed entirely of mungo and cotton, and good use has certainly been made of them. There is no wonder such fabrics sell readily, for to the man who knows nothing of the quality of a fabric, it is bound to be seductive. He stumbles and is entrapped solely because of the faked appearance which the cloth presents. As he feels the fabric he is satisfied that it will do admirably, and accordingly buys it.

The woolen trade of Yorkshire today seems to be trying to deceive the million, and introducing something that looks well, without any regard whatever to the wearing capacities of the cloth. The man on the street when he buys something cheap that looks nice seems to be satisfied, and goes along without caring one jot or tittle until it rains. But let such a fabric get well rained on, and if the colors do not run, his whole suit will be as soft and spongy as possible, while his trousers will bag and look despicable in the extreme.

Then a large quantity of these cheap woolen tweeds are shipped abroad, and it seems to me that they are better suited for such climates as Australia, South America and the East than they are for England, though the wearing properties of the cloths are altogether absent. The makers of these goods seem to have forgotten that there is in the world such a thing as real wool.

Our last cloth, No. 4, is selling in thousands of pieces, and the firm making it is very busy. It is being consumed entirely by our wholesale clothiers in the production of ready mades, it being too low for the specials, or our woolen merchants. I would not like to say that it will stand much wear, but that is not the point. So long as it sells, that is enough. It is woven one and one, the warping being one thread grayish white cotton, one thread black woolen, the weft being all dark gray woolen. It is the price that sells it, 24 cents 6/4. The reader will see from the photograph what the cloth is like, and here we have certainly a cloth well made and smart at the price. If there was no Dingley tariff in the way, all the mills in Batley, Dewsbury and Huddersfield would be running day and night on American account, because of the remarkably cheap fabrics which are being turned out.

The New England Cotton Manufacturers' Association.

There was a record attendance at the annual convention of this association on April 26-27, at Boston. After an address of welcome by the Hon. Louis A. Frothingham, Speaker of the Massachusetts House of Representatives, President Walmsley spoke as follows:

President's Address.

BY HERBERT E. WALMSLEY, New Bedford, Mass.

Gentlemen of the New England Cotton Manufacturers' Association:

It is with very great pleasure that I rise to address you upon this meaningful occasion, and as President of this Association, as well as on behalf of my colleagues on the Board of Government, to bid you all welcome—a very hearty welcome—to the 78th Convention of the Association.

At the same time permit me to remind you that these conventions are occasions for business advantages as well as for social intercourse.

I desire, also, to give expression to the hope that our coming together here, and in this manner, may be mutually beneficial and gratifying in every sense of the word.

I perhaps need hardly say that every member of the Association is entitled to participate in the discussions that will take place. You are cordially invited and earnestly urged to do so.

You are likewise requested to be in your places to vote upon the several questions that will come before you and claim your attention during the sessions about to be held.

In my judgment it is equally as important, gentlemen, that we should in these conventions discuss and deliberate upon the measures, and the policy of the measures pursued in the management and conduct of the industry, as it is to discuss the manufacture of cotton, the steam engine, electricity, or the many technical and other subjects in connection with the industry in general.

If there is any disposition to check this freedom of inquiry in this particular, the firmer and more determined, I submit, should we be in the exercise of our undoubted prerogatives as individuals, and as an organization, to canvass without fear or favor the methods pursued by the trade in general, and by the men responsible for the well being of the trade.

We are, many of us, unfortunately, too apt to shut our eyes to unpleasant truths and facts, and too much disposed to be of the number of those who having eyes see not and having ears hear not some of the things which so nearly and so vitally concern the welfare and the future of the industry.

This Association should, in my judgment, discuss intelligently and dispassionately all current topics of especial interest to the cotton industry, both economic and industrial.

The strong and influential position held by our organization in the cotton world is cause for much satisfaction, and gives every promise of continued and increasing usefulness.

Our proceedings, as you well know, attract widespread attention, and excite deep interest in the general business community in fact, it is no exaggeration to say our meetings are of international interest.

Let us therefore, and in view of these facts, devote ourselves to the business before us with a zeal and an earnestness of purpose worthy the occasion and worthy the Association in which we, all of us, have one common interest, an Association that has become such a potent factor in the great trade of the country.

If our proceedings upon this occasion should promote the well being of the industry, we may well feel ourselves amply rewarded.

It is, gentlemen, with peculiar and lively satisfaction that I am able to congratulate you upon the improved and improving condition of trade.

The past two years in the cotton industry have been years of depression, and heavily weighted with anxiety, as we all only too well know.

Strikes, reductions of wages and of running time, much machinery stopped with curtailment of production in every direction is what we have experienced.

Through it all the cotton manufacturing industry of New England has in general stood substantially firm and steady; it has successfully withstood the test of two years' adversity and, if conducted on broad and sound lines, and in a spirit of fair play and equity, it can stand trial, it can stand assault, it can stand adversity.

The suggestion that New England's great staple industry is on the wane, on the decline, is worse than absurd it is a reflection upon common sense.

No greater mistake can be made than to imagine there is anything to justify such a narrow, short-sighted conclusion.

On the contrary, established upon a solid foundation as it is, it will continue to play a far greater part in the future than it has done in the past, and will continue to be an important factor in the progress and prosperity of New England.

The present outlook, I rejoice to say, is decidedly hopeful and encouraging, and I venture to express the hope, the belief, that the improvement in trade already manifest may be of so permanent and beneficial a character that we may again participate in an industrial and commercial prosperity no less great than the prosperity our friends across the water are now enjoying, a period of profitable activity unknown—if I am not mistaken—to the present generation of cotton manufacturers over there.

It is not every one, perhaps, who realizes the extent to which the prosperity of New England is wrapped up in the cotton trade and industries subsidiary to it and dependent upon it.

It is no exaggeration to say that, directly and in-

directly, by far the larger portion of our people get their living by cotton.

Thousands of mill operatives and their families rely absolutely upon the running of the machinery connected with the spinning and weaving of cotton.

Printers, bleachers, dyers, and innumerable other artisans deal with the gray cloth after it leaves the hands of the weavers; also to be taken into account are those engaged in the carrying trade and the coal trade.

Then again cotton finds employment for a great army of mechanics, machinery builders, and engine and boiler makers.

Repairs to the machinery are always proceeding, and renewals are continually going on, finding employment for thousands of other men.

Other considerable sections of the community dependent on cotton trade are the cotton dealers, and the merchants who dispose of the products of our spindles and looms, and many others with their offices and stores for the storage of cotton and cotton goods.

Add to all these the large number of trades people of various kinds who depend upon the custom of all these several groups of workers, and some realization can be formed of the vast numbers of the population who are vitally interested in this great staple trade.

It will thus readily be seen of what supreme importance the cotton trade is to the community at large; hence, again I repeat we have every reason to rejoice in the fact that we are at last emerging from the depression and stagnation from which the cotton industry of the country has suffered so long.

This improvement in trade, this revival of prosperity is of deep significance to the community as a whole.

In the firm belief that a clearer and more comprehensive understanding of the problems and difficulties surrounding the industry is desirable, permit me to suggest the seeming advisability of free and open discussion in these conventions of all matters affecting the welfare and the future of the industry, and to some of which matters I am about to invite your attention, as I have not hesitated to do on previous occasions when addressing you.

Let us hope that our investigations and our deliberations may result in action of such a beneficial and permanent character as will help remove the causes and the influences which oppress and demoralize the great trade in which we, all of us, are so vitally concerned.

The prosperity of New England is largely indebted to the cotton industry and, like many another faithful servant, it is unfortunately to be feared that in not a few instances its well-being has been, if not ignored, at least misunderstood by some of those who have derived most advantage from it.

Let us, without fear or favor, as individual manufacturers, and as an influential and representative organization of manufacturers, endeavor to arouse a sentiment which will sweep away abuses and offenders with as little compunction as has been shown by those same offenders in relation to the welfare of the important interests with which they have been entrusted.

If these vast industrial interests are to be preserved to New England, it is, it seems to me, high time that the stockholders and the public in general took a more active and intelligent interest in their welfare and preservation.

It is not too much to say that the cotton industry is of national importance, and the country as a whole is deeply interested in its existence and in its prosperity.

Right or wrong it seems to be an accepted principle that reforms, whether national, local, political, or social, shall not be attempted unless those in authority are stimulated by pressure from without, the creation of a sound, healthy, and public sentiment being abnegated by those who ought to create and foster it; in the meantime, the public welfare, which constitutes the true wealth of communities, must not be allowed to suffer through the remissness, the inexcusable neglect, of self-satisfied or self-appointed officials.

Let those among us who have power, influence, or authority see to it that no effort be lacking on our part in ridding the industry of abuses detrimental to the interests of the industry in particular, and detrimental to the interests of the community in general.

Let us see to it that the cotton manufacturing industry of New England is managed and conducted on broad, sound, and equitable lines, thus enabling us to fight the battle of keen competition which now exists to a greater degree than ever before, and which, as time goes on, will become more and more intensified.

It may perhaps be recalled, gentlemen, that at our semi-annual meeting held in the White Mountains last fall I took occasion to draw particular attention to the unfortunate and unsatisfactory physical and financial condition of not a few of our New England mills.

I also very pointedly suggested the advisability, the necessity, of a radical change of both men and methods whenever conditions were in such bad shape as to call for reform and reorganization of a drastic character.

I have since discovered no reason for changing the views I then expressed and, while I desire to be temperate and courteous in what I do say, I consider no apology necessary, nor do I offer any for again referring to these same questions or matters; on the contrary, I do not hesitate to say right here and right now that, so long as we retain the power of speech, so long should our voices be raised and our protest heard against causes and abuses detrimental or harmful to the wellbeing of the industry, no matter where found, or by whom perpetrated, employer or employed.

When trade is bad, both sides must make concessions; when trade is good, both sides should reap the benefit.

Personally, I am of the opinion, that the day has gone by when any small group of men on either side should be permitted, by a mere wave of the hand as it were, to stop the wheels of industry, demoralizing and paralyzing both the industry and the community.

I utterly fail to see by what right or title half a dozen individuals of either the manufacturing or the labor element should be permitted to arrogate to themselves, in this so-called enlightened age, such authority, such prerogative.

If the trade is to be profitably and successfully

maintained, it is obvious and imperative that none but broadminded and capable men with a thoroughly able appreciation of this great question should be permitted to regulate the course and direction of interests so far reaching.

The adoption of machinery designed to ensure the most economic and efficient system of production marks a wise and worthy attempt to place the industry on a firmer foundation than ever before.

It must not be overlooked that these inventions, I refer especially to the automatic loom and the warp motion, are open to others as well as ourselves, and not only may be equally shared in by them, but may and are being utilized with effect against us in the keen competition and rivalry of today.

On the other hand, in connection with the introduction of improved machinery and new devices, it is asserted—and these things are openly stated in reputable daily papers and textile journals—that the operatives have grievances that are due to the heartlessness of the men who employ them; the actions of some of these men, we are told, have been simply low-lived, and, further, that there has been no exigency in the business entrusted to them by stockholders that warranted them in any degree in pursuing the course they have followed.

Further, it is said, the whole situation discloses a weakness in mill management that is making thoughtful stockholders heartsick and weary of the mill business.

Aside from the great injury that has been done to the operatives, the industry as a whole, it is pointed out, has been injured in a way that may take months for reparation, the consequences going far beyond the few mills—the few mills, note you, gentlemen—that are notoriously wrong, and again, we are told, the injustices that have been practiced in some mills have aroused some managers to speak out against them because the good name of the industry is at stake.

Such a condition of affairs cannot but give rise to serious apprehension, and is calculated to do harm by instigating revolt.

Such conduct cannot be witnessed without indignant protest; conduct so unsound, so wanting in grasp of the situation, that it is hard to realize that such a state of affairs is possible.

The most serious reflection excited by such attitude is the importance of a closer and stricter supervision and regulation, if need be, by the directors and stockholders that shall hold to strict accountability the men who practice such methods.

The wrong committed should be amply and speedily rectified; the prosperity and the honor of the industry must be kept steadily in view, regardless of any other consideration.

It should not be forgotten that employers have obligations as well as privileges.

All power is a trust, and we are accountable for its exercise; no act of injustice can be perpetrated with impunity

In connection with this matter, I trust I may, with all propriety, say that no man, be he whom he may, employer or employed, should be tolerated, who for any reason whatsoever ignorantly jeopardizes the welfare of New England's staple industry.

In so far as this sentiment goes, I do not believe any dissentient voice will be raised.

That by far the great majority of employers in their relations with the employed are actuated and influenced by sentiments of justice and fair dealing, there can be no question.

We refuse to believe otherwise.

I trust that what I have given expression to in this connection may not be wrongfully interpreted as wishing to engender an ill feeling between two bodies whose only strife should be as to which can do the greatest good for the common good of both, and for the common good of the industry and the community.

The first step towards obtaining any true grasp of all difficulties and problems must be to look fairly and bravely in the face the facts which lie behind them; it is worse than useless to ignore them.

There is a time to speak and a time to keep silence and, while I am desirous of not overstepping the possible limits of good taste or discretion, I must say it is amazing that the trade should be subject to such injury because of the unwisdom of a few men.

There can be no question of the importance, the necessity of industrial contentment, transcending as it does in interest and importance any other industrial problem, if not any other problem of the age.

There are, gentlemen, other subjects of much importance to the trade, one or two of which I will, with your indulgence, briefly refer to, and which doubtless are engaging your individual attention, and which I venture to submit call for the collective consideration and wisdom of this Association.

In view of the unfortunate physical and financial predicament of some of our New England mills, it may not be inopportune at this particular time to emphasize how absolutely imperative it is to write off annually a sum amply liberal to adequately provide for the discarding of machinery which has been superseded or become practically obsolete long before it is worn out.

No dividend should be declared unless a certain amount for depreciation has been set aside, or unless the corporation has an ample reserve from which such dividend might safely be taken.

The wear and tear in the working of a mill is constant and great, and becomes a very serious item; it is necessary to make the proper allowance for it, which unless provided for is a gross miscalculation, and in time, as we see, is sure to be attended with disastrous consequences.

We all know that a working mill depreciates through the wear and tear of the machinery; an idle mill through rust, neglect, and actual decay; both depreciate by the progress of invention resulting in improvements that render the machinery valueless; the value of a mill never remains, neither when working nor idle, and care should be taken to get the original capital back from it intact, before it is irretrievably lost.

In connection with the subject of textile education I need hardly remind you of the extent to which provision is made abroad for the supply of instruction of a technical and scientific character in aid of the industries of England, France, Germany, and other countries.

The great commercial and industrial progress of Germany, which is perhaps more marked and pro-

nounced than in any other country, is to be largely attributed, it is said, to the splendid industrial schools of that country.

In the firm belief of the industrial and commercial value of technical education, steady advance must be made by us in the further provision of facilities for higher scientific training as a means of developing our manufacturing industries, otherwise there can be no doubt that our supremacy in New England will be seriously challenged.

The textile school is unquestionably of singular value in training up a supply of well instructed young men capable, by reason of the methods employed in these schools, to take the lead as overseers and superintendents in our manufacturing establishments, adding to their equipment for the practical work of the mill.

The time is upon us when we must exchange the work of our hands and the thought of our brains with those of other countries.

We enrich ourselves in the degree in which our knowledge and work are equal or superior to that of others.

Technical and scientific training is one of the great hopes upon which the cotton manufacturing industry of New England must depend for the continuance of its prosperous existence.

A word with respect to the treatment of cotton mill properties by our legislators and tax gatherers:—in frequent instances our cotton mills have suffered severely from excessive taxation under circumstances where it would be expected that any deviation from the strict letter of the law would be exercised on the side of leniency.

The establishment of any large industry in a town may be due to natural water supply, freight facilities, or favorable atmospheric conditions, and this in turn has brought into the town a large amount of property which would not otherwise be there, and this, with the tributary industries which have sprung up in connection with the homes and living of the large population, has brought prosperity to locations which would otherwise be sterile farming districts or perhaps a few fishing hamlets.

The residents of some towns, in the exercise of the rights of numerical majorities, have entered upon public expenditures to an extent which would not be contemplated with an equivalent population except in connection with such large concentrations of nonresident property.

The excessive valuations have been so onerous that long and expensive litigation in the higher courts has been necessary to establish the equities in the matter.

It is this appraisal to an excess above market values which has imposed a serious impediment upon manufacturing in locations where it should, in all justice, have received every welcome and all the encouragement which could be offered to any enterprise bringing to such a community widespread conditions of prosperity.

Oftentimes, the corporations receive very little direct benefit from the money raised by taxation of which they pay a very large share.

There is little or no justification for deriving revenue from a particular class of property, or kind of business, merely because it is believed that it can be easily done; the effect upon the business subjected to the exaction is vexatious and oppressive; undue or excessive taxation has a detrimental effect upon the industry; unjust and unjustifiable taxation is, to say the least of it, unbusinesslike and inexpedient, the business being unable to bear too heavy a burden of this kind without serious injury.

I take it as incontrovertible that the group of states known as the New England states, in all matters affecting these states, intend and are determined that they shall lead, not follow; that they shall continue to be the pioneer states of the Union in everything that goes to make for progress, advancement, and prosperity; in everything that helps forward the cause of humanity; in everything pertaining to the common good and well being of all alike in these same states.

We ask and desire, as I understand it, no advantage in any particular over any of our sister states, nor do we, I feel confident, desire any legislation of a retrograde nature.

On the other hand, however, and in all reason, equity, and common sense, as a simple business proposition, we do and must respectfully ask and insist that our legislators do not unduly and unfairly handicap us and cripple our industries by imposing upon us such severely restrictive laws that we cannot longer compete with other states with any degree of legitimate profit or success.

We must as a matter of simple self-preservation make haste slowly, or at least conservatively in this direction; we must not forge too far in advance of our neighbors and competitors to our own detriment

There is a point, a limit, beyond which it is unwise and inexpedient to go in the matter of restrictive legislation in these days of keen and growing competition with each other and within our own borders.

Note the solid and masterful advance of the manufacture of cotton in the Southern States in face of the established industry in the North; the successful establishment of the industry in the South in such magnitude is not a temporary situation, it is a permanent and meaningful fact, and is of especial practical concern to New England, making itself felt very effectively, aggressively competing with us for business and getting it.

Too oppressive laws will inevitably result in stimulating the growth and development of all industry beyond the jurisdiction of the states imposing the same.

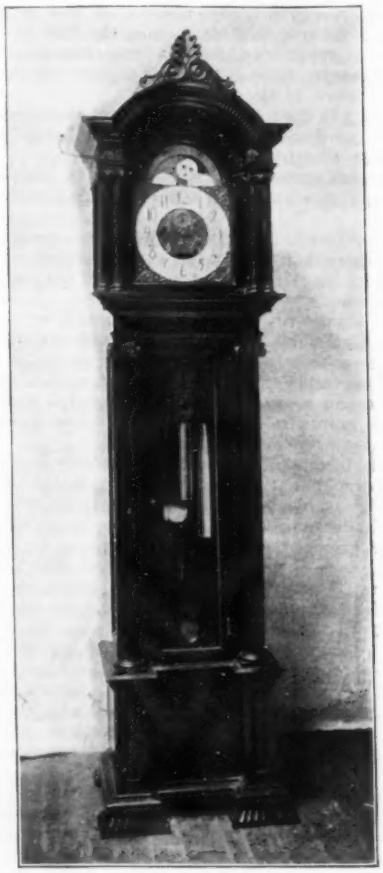
Opposition to unduly restrictive legislation should by argument and information be as vigorous, forcible, and effective as circumstances demand.

One more reflection, gentlemen, and I conclude: It is evident that we have reached a period in the history of the cotton manufacturing industry of New England, a point where it has become more than ever necessary to exercise the strictest economy and the highest degree of efficiency in every detail, in every particular; where the peaceful and orderly development of the industry must be assured; where we must ask ourselves the question, what have we done, what are we doing, what have we achieved; where we must dispense with the men who have done everything they ought not to have done, and who have done nothnig that they ought to have done; where the qualities necessary for the welfare of the industry are great mental energy, enterprise, powers of prolonged application, and a

sense of simple minded and single minded devotion to duty, a pursuit which steadily continued will obtain for it the approbation of all honest and honorable minds.

Despite the complexity of the problems encountered, despite the complex rivalry and competition encountered, a rivalry keener, a stress severer, a pace quicker than ever before; ceaseless progress on the one hand, ceaseless stress and competition on the other; despite all this, I say, we do not understand the verb "to fail" nor are we acquainted with the word "impossible"; the free utilization of the powers of the best men in the places for which they are best fitted; the free utilization of such men in the fullest degree, in the management and direction of the industry, in the direction of invention and of improvement, the cotton manufacturing industry of New England will not suffer; it will develop in magnitude, importance, and prosperity that will make it, as time goes on, pre-eminent in the cotton world, that will make it one of the great factors, one of the most potent factors in the life and the industrial development of this great country.

Gentlemen: In view of the fact that we are, as a nation, entering the first phase of a new world-wide commercial struggle; in view of the increasing and complex rivalry encountered on every hand; in view of the immensity of the interests dependent for their prosperity on the cotton manufacturing industry, the fate of this industry is not and cannot be indifferent to any of us. We are jointly proud in the consciousness of being responsible for its well-being, and answerable for its future. The one grand object of our contemplation must ever be to safeguard its honor and to see to it that its future be assured, in so far as human effort and foresight can devise and determine. This, I take it, is the legitimate aim and aspiration of the New England Cotton Manufacturers' Association.



HALL CLOCK AND BRONZE PRESENTED TO SECRETARY C. J. H. WOODBURY.

An event not on the program then occurred. President Walmsley called attention to a handsome mahogany hall clock and a

bronze l' Infini, and presented them to Secretary Woodbury with the following words:

Before we proceed further with the regular business of the meeting I have a most pleasing duty to perform in a presentation I am about to make on behalf of the New England Cotton Manufacturers' Association to our secretary and treasurer, Mr. C. J. H. Woodbury.

As you may be aware, it has for some time past been felt that some fitting recognition should be made of Mr. Woodbury's faithful work during the ten years he has held the office of secretary and treasurer of this Association; hence this testimonial, and I feel myself favored, in that it has fallen upon me to be the mouth-piece of the Association upon this occasion.

The committee having this matter in charge, consisting of Mr. James R. MacColl, Chairman, Mr. George A. Ayer, and Mr. C. P. Brooks, after much consideration decided to purchase as a fitting testimonial this hall clock, and this bronze which you see here on the platform, and which it is hoped will meet with your approval. The members who have contributed to this testimonial have not only shown their appreciation of the movement by their generous contributions, but by many letters which they have sent warmly commending the services of Mr. Woodbury.

It affords me, sir (addressing Mr. Woodbury), very unusual pleasure to present to you on behalf and in the name of the New England Cotton Manufacturers' Association this evidence of their esteem and regard—these tokens of their appreciation of your invaluable services.

My only regret is that my poor words so ill convey, so poorly express, the kindly, generous and appreciative sentiments of the members toward you, and it is earnestly to be hoped that this association may for many years to come derive the benefit of your great interest in its welfare, which sentiment is held by every one of the eight hundred members of this association. (Applause).

Mr. Woodbury was greatly affected and found it difficult to express his appreciation of the expensive gifts, which he prized chiefly as tokens of the good will of those with whom he had been associated for the past ten years. After this pleasant incident in the proceedings the Association medal was presented to Henry G. Kittredge, of Boston, for his paper, The Economic Extension of Cotton Cultivation in the South, read at the September, 1904, meeting. After the presentation and approval of the reports of the secretary and treasurer, the following papers were read:

Static Electricity Neutralized.

BY PHILIP DANA, Westbrook, Me.

Static electricity has been tersely described as a pressure of electricity, rather than a current of electricity.

Most of us familiar with the manufacture of cottons have run up against it on cold, dry mornings, either in a card or drawing frame, and have wished for some method to overcome it completely.

It has been found necessary to keep a fairly high degree of temperature and humidity in rooms; partly to obtain more uniform and stronger work and partly to overcome this static electricity. The necessary degree of heat is easy to obtain, but it is hard to have, when first starting the machinery, a sufficient amount of humidity without the use of very moist steam, always unhealthy, or without having a separate power plant for running humidifiers before the machinery is started up.

In the dyeing of warps, we have used the long chain system and the straw patent winding and unwinding machines. The warps, coming from the drying cans very dry, are passed through an unwinding machine for the removal of a protection thread used when dyeing and then run between carrier rolls and down through folding trumpets or shutes.

The warps, particularly those made from long stapled combed Egyptian or peeler stock, become thoroughly charged with electricity passing through the carrier rolls and cling to the trumpets, becoming very much snarled up and cutting down production on winders and beamers.

We have applied the Chapman Process of removing static electricity to our unwinding machines with entire success and expect to be able to use it the coming winter on our drawing frames, especially where we use long stapled cottons, both carded and combed.

The device consists of

"1st, a source of alternating current." (Any 110 or 220 volt alternating lighting system.)

"2nd, a transformer to step the alternating current up in voltage to an amount somewhere between 10,000 and 20,000 volts."

"3rd, an inductor to distribute this high voltage current over the substance to be treated."

The inductors are fine steel wires and are incased in hard rubber, the fine steel points being flush with the rubber case.

The principle on which it works is as follows:—

"A static charge spontaneously selects from a neighboring alternating charge, the kind and quantity of electric current exactly to neutralize itself." If the static charge happens to be positive, it would take from the inductors enough negative current to neutralize itself and vice-versa.

Static electricity in any material is very small in quantity, although of a very high voltage, and the quantity required to kill it is correspondingly small. This fact allows the transformers to be constructed so as to limit the maximum output to a few mil-amperes, thus making it perfectly safe for a person to take the whole charge.

While this process has had a limited application in cotton manufacturing, it has, in other branches of manufacture, been extensively used.

On paper machines, paper bag machines and printing presses, it has been of very great value, the production being more than doubled in some cases. Some woolen mills have used it successfully on their cards and another firm has used it on their shearing machines, finding it much easier to brush off from the cloth the dust and short fibres from shearing, where no static electricity existed.

Gray Goods for Clay Filled Work.

BY DANIEL MOORE BATES, Wilmington, Del.

Clay filled goods have three principal uses. They are used for bags for salt, flour, etc.; for window shades; for sign cloths. To whichever use they are put, in no case do they go direct from the bleacher to the final consumer; in other words, they are "raw material" when they are received by the bag manufacturer, the shade maker, the sign painter. It is the object of this paper to trace briefly the special requirements of these three trades on their bleached goods in so far as these requirements are affected by the gray cloth.

Practically all of this work is done on plain woven goods of comparatively low count, rarely running higher than 64/64, and on some bag work, as low as 32/28. A typical piece of goods for bag work runs about 28 inches, 44/44, 9.50 yards to the pound, and for shade and sign work 40 inches, 56/56, 6.00 yards to the pound. It is of course not to be expected that cloth of this character can be given the same care and inspection at the mills as lawns, satines, or reps; but for this very reason, it is essential that whatever attention it does get be directed to those points which most affect its final usefulness. Moreover, on work of this grade competition is very keen all along the line and the margin of profit, where it exists at all, is at best a slender one. For this all compelling reason it behooves bleacher and final manufacturer of the goods each to see to it that his "raw material" received is up to such a standard of quality that he can convert it into his "finished product" without any expense of extra handling.

By this I mean that the bleacher must receive gray goods which are sufficiently uniform in spinning and weaving to enable him to fill them satisfactorily at a price; that the final manufacturer, the bag or shade or sign maker, must receive goods sufficiently well filled, strong and free from imperfections to enable him to deliver satisfactory bags or shades or signs to his customer at a price. This price is fixed. It is close cut. Any extra expense incurred in getting this final standard product means loss somewhere, and this loss can be avoided only by each participant in the final product receiving standard "raw material" and turning out standard "finished goods."

These remarks apply with special force to bag work, from which, whatever the handsome dividends accruing to our confreres, the weaver and the bag maker, it is a lucky bleacher who gets back a new dollar for an old one!

The two essentials of a bag for salt or flour are that it shall be strong and non-porous, that is, it must not "bust" when stuffed fat and full, and it must not let its contents sift out through holes in the cloth. Competition demands a cheap bag, hence low count clay filled goods are used in place of high count unfilled cloth, clay being cheaper than cotton. Now it is just on these points that the selection of the proper construction for the gray goods depends. The lighter the weight of the yarns and the lower the count of the cloth, the less the cost of gray goods, but at the same time the less the strength of the finished bag and the greater the expense of clay filling it. Sufficient twist for strength in the yarns must also be had, but too much twist renders the yarns harsh and wiry, so that the clay filling will not penetrate nor adhere to them and the resulting finish is poor in comparison with other goods of the same weight and count.

No art of the bleacher can fill the goods beyond a certain point with one sizing. If, however, a very low count is strong enough for the use intended, it can be sufficiently filled with clay by additional sizings. It is then for the bag manufacturer to decide whether the extra expense of finishing offsets the lower cost of gray goods. Incidentally he must take into account that the more clay and the less cotton, the more brittle are the finished goods, that is, the more liable the clay filling to break out.

Suppose then, after weighing the above pro and con, the bag maker settles on the construction of his gray goods, figuring his cost on a grade of cloth which in single filled bag finish furnishes a suitable bag for strength and density of clay filling. Two vital and not uncommon faults in the gray cloth will affect both of these qualities. They are mixed filling, uneven weaving; they have the same results. The lighter weight yarn usually appearing from mixed filling or the smaller number of picks from uneven weaving due to faulty let-off and take-up motions, in either case reduce the strength of the bag and at the same time render it more porous because of the inability of the bleacher to fill it without additional work and increased expense. The reason for the latter is evident from the fact that in either case there is not so much cotton for the clay to adhere to. On such goods, where the difference in strength is not serious, the question at once arises, "Shall additional expense be put on them to bring the clay filling up to the standard, and if so, who shall bear this expense?" This question I find touched upon in a previous paper "Gray Goods from the Bleacher's and Finisher's Point of View" from which I quote:—

"Uneven weaving appears principally in the low count, cheap grade goods. Many of these are used for clay filled bag work and for cheap linings for other than clothing purposes. It is often impossible to fill such goods on account of the unevenness of the weave. Naturally we cannot expect to have these cheap goods perfect. At the same time smoothly working let-off and take-up motions on some looms would work wonders, and would curtail rather than add to the expense of manufacture. As explained above, it is impracticable to have the gray goods carefully examined at the bleachery. It is, therefore, often the case that a lot of goods is bleached and ready for sizing before the trouble with the weave is discovered. At that time it is too late to get any satisfaction out of the manufacturer, who piously washes his hands of the whole matter, being convinced that the pull on the cloth in bleach is responsible for the bad condition of things. In such a dilemma the only resource is to watch carefully for the next lot of similar goods from the same mill, and on its arrival make a thorough examination. In many instances defects in the gray cloth are found, and repeated experiences of this kind convince us that finishers are not the only ones who have their failings."

The remedy for mixed filling seems simple, a

systematic handling of filling bobbins from spinning to weave room, and as far as possible the concentration and isolation of all looms on this work. For uneven weaving, a strict oversight of the let-off and take-up motions of the looms. These remedies are practicable and they cannot be neglected by mills handling this class of work.

Uniform gray width is important on all clay filled work, especially so on bags. The up-to-date bag manufacturer will insist on full finished width. His work is laid out to cut so many bags to a width. If this runs narrow, one set of bags in each cutting is thrown out, or has to be put into an odd lot of smaller size. Uniformity of finished width being dependent on uniformity of gray width, the mill man must see that the tension on his looms is uniform and that there is no mixture of widths in baling goods for shipment.

SHADE GOODS.

This work differs essentially from bag work in two points.

First, a better average grade of cloth, a higher count, heavier weight fabric is used, which removes the work from the "ragged edge" as to questions of clay filling and of strength.

Second, the final finished product, being used against the light, must be very uniform in texture. Light colored shadings transmit some light and these, especially, show up any defects very clearly; while dark colored, opaque shades must be free from even the smallest weave-holes, through which the light strikes in fiery little pin points.

Briefly, the clay filled cloth from the bleachery is first run by the shade manufacturer through a thin glue solution which prepares its surface for the subsequent painting in colors. On emerging from the solution, the cloth is drawn against brushes which remove the surplus glue, and then on to a frame, where it is held by pins or clips along the selvages, to be stretched and dried. Here the goods are drawn out often two inches or more to their original gray width. While I am not conversant with the details of shade making, I want to bring this particular point of hard stretching on the frames to your attention, for it will be evident to you that whatever defects in the way of holes are already in the goods, no matter what their cause or how much they are covered up by the clay filling, they will here be opened up, and no effort of the shade maker later in the painting can cover them.

This brings us to one of the principal defects found in gray goods for shade purposes, namely, holes from weaving. These largely come from three things:—

Slubby, or lumpy filling yarns, where the lump of unspun cotton pulls off before the shades are finished (or, if not, leaves an unsightly lump on the face of the finished goods).

Broken warps which, in piecing-up, are drawn by the weaver under adjoining warp threads. These when woven in with the filling draw the mesh of the cloth open.

A rough sand-roll on the loom. The trouble caused by the last named is thus explained in a previous paper "Gray Goods for White Lawn Work".

"A defect from weaving which is largely magnified by the framing, though it does not cause breakdowns, is a small hole, sometimes only one broken thread, repeating regularly through the piece twenty-one to twenty-three inches apart and at a fixed distance from the selvage. These holes are made by a rough place on the sand-roll of the loom as it winds up the cloth. 'Sand-rolls' made of tin with a cullender surface are particularly apt to make them."

Shade goods and lawns bear this relation, that before they reach their final form they are both run on frames and subjected to very heavy tension in width, which opens up the smallest holes. On bag work these very small holes are not so serious, as there is no framing of the goods after they are filled with clay.

Long, hanging threads on the face of the cloth cause considerable trouble on shade goods, bunching up in the clay filling and making dark lines, or, if then picked off, leaving a light line where the clay is removed with them. Kinky filling, snarly ends from a spent bobbin, and half picks are also very objectionable.

In suggesting how to overcome defects, I have but to recall your attention to the cardinal points of difference between bag and shade work already mentioned. At once it is seen, that while the successful weaving of bag goods demands first and foremost system and method in laying out and handling the work, the sine qua non of shade cloths is good individual weavers. The weaver should remove all long ends when piecing-up a broken warp, first placing his forefinger on the warp end to hold it down straight with the weave until it is fastened by the new filling. He should not draw it under adjoining warp threads across the weave to save time. He should also see that no ends of filling, half picks, are left in the cloth on changing the shuttle. If Northrop looms are used, they should be equipped with the new "feeler" device which changes the bobbin before the filling runs out. Since the advent of the Fall River strike, which by the way opened up a number of new sources of supply for the bag and shade trades, we have finished shade goods from a southern mill, which are excellent in every way except for snarly filling ends and small weave-holes. I understand these goods are woven on Northrop looms without the feeler device. With this improvement and with a little more care on the part of the weaver, or perhaps not quite so many looms for each weaver to run, the goods should be beyond criticism. Hanging threads which do not get snarled or tangled into the cloth on the loom, can be readily picked off by the inspector in the cloth room, or removed by a shearing machine, but in no case should they be sent out in the gray goods.

Since the smallest defects in shade goods show up in their use against the light, everything which contributes to the uniformity of the cloth adds directly to the excellence of the finished product; and in this connection too much stress cannot be laid upon the need of good spinning, of good level yarns free from lumps and heavy places, and free, also, from oily threads which will not bleach out. Any heavy, irregular warp threads running through the piece are particularly bad and should be looked out for in the beaming. While a slight variation in the number of picks is not so noticeable as in the lower count bag work, any irregu-

larity in the let-off and take-up motions which causes heavy bars of filling yarns across the piece is distinctly injurious. Be careful, too, to prevent cam-spatters and other oil spots in weaving; but above all things, to keep up a standard of excellence in this work, have your yarns spun level and your weavers good individually.

As regards the bleacher's handling of shade work, nothing is more desirable than good selvages, not only for the proper singeing and bleaching, but also for the subsequent clay filling. The desirable selvage is strong, but not wide or heavy. Otherwise, on heavier filled work the selvages become too thick when sized, "pile up" on the ends of the rolls, and are likely to break in running through the machines. When this happens it makes short lengths, or if the breaks are too slight to cut out, renders the goods difficult to handle on the shade maker's frames. As most of these frames are built to take sixty yard lengths, it is desirable to have the gray lengths for shade goods uniform, in multiples of sixty yards or thereabouts, to avoid waste of time in framing shorter pieces.

SIGN CLOTH.

It is often said that the happiest nations have the least history, no wars, no tumults, no troubles, nothing "interesting" to write about them. So with sign cloth in the clay filled work of the finishing business. Being mostly of about the same grade of cloth as shade goods they, too, are largely removed from the "ragged edge" of trouble with the clay filling. But unlike shades they are not held up against the searching eyes of the sun which seek out each little irregularity. Nor are they, so far as the writer knows, put through the trying ordeal of framing, where the severe tension overlooks no hole nor point of weakness. Therefore it will be seen at once that many imperfections which in shades and bags would be serious, will be covered up in finishing, never again to appear. Small variations in count, heavy bars of filling yarns, thick threads, and to a certain extent oily yarn and spots will all be forgotten under the gaily colored signs as they hang on tree, barn and fence throughout the land; but lumps in filling yarn, hanging threads, large weave-holes, anything which impairs the surface for painting and finish are objectionable. Moreover, the selvages should be made as explained for shade goods, and the width should be woven full and uniform, so that the sign painter may not come short in cutting out his signs any more than the bag maker in cutting out his bags. Sign cloth is a comparatively new business, but a growing one, and one very pleasant to handle. With any sort of reasonable care, the mill man should be able to weave goods satisfactory for it.

Mill Ventilation and Its Influences.

BY EBEN C. WILLEY, Hope Mills, N. C.

As the head of a department I always dreaded the warm weather more than I did as manager, as it brought me in closer touch with all the difficulties experienced at this time of the year, and which would not necessarily come to my notice, to the same extent as they would to me in the position of manager. The months of July and August are the most trying as the heat is usually more protracted and may extend over a period of several days or more, and as the operatives and machinery become affected by the excessive heat, the conditions which develop at such times, particularly in the carding and spinning rooms, can hardly be endured, as the cotton is readily affected by the atmospheric changes in these departments and cannot be easily controlled, for heat with extreme humidity is a detriment to good spinning.

The frictional heat generated from machinery, oil and the accumulation of unclean cotton which is found about all cotton spinning machinery, creates an unhealthy condition, making the air foul and enervating to the operatives on a hot, oppressive day. Realizing this, I have many times been lenient when otherwise I should have been severe, had I not known the effect of a close, unventilated room on a hot day.

The conditions surrounding a cotton mill on a day like the above, can only be imagined, unless it is by those who have had to overcome the difficulties incident to the trying time which occurs during this season of the year.

Any improvement which can be secured to lessen and mitigate these conditions would be a great boon, both in the interest of the manufacturer and the contentment of the operatives. These conditions have been found to exist in some of the best mills in New England, and I have noticed in these mills on warm days in the summer, an utter lack of energy in the operatives, and a disregard of every thing which would show a well disciplined department, wholly on account of the discouragement induced by the work being affected by the weather.

In this connection, I might add that it is the usual custom in all cotton mills to close the windows at night; but if many of our mill managers could realize the effect of the foul, stagnant air in their several rooms at starting time in the morning after an extremely hot, sultry day, it would seem that provision would be made for the ventilation of the carding and spinning rooms over night, as I have found this condition to exist in all mills, and the only remedy which I could apply was the free opening of the windows in the early morning. It has a salutary effect on the operatives as well as the benefit derived from the operation of machinery at this time.

While knowing these conditions existed, and realizing that something should be done, I had never thought of the best method to overcome same till the propeller fan was brought to my attention; and after a thorough trial it demonstrated its value by the improvement in the spinning of the cotton, and I have adopted them for the carding and spinning rooms wherever possible. Owing to the benefits derived by the use of fans, I have come to the conclusion that it is not so much the high temperature or the humidity that causes the difficulty as it is the foul, stagnant air, which affects both the operatives and the work.

If the impure air can be eliminated, it results in such improved conditions that good work is usually assured, and although the day may be hot and uncomfortable on the outside, with a free circulation of air inside the mill caused by the exhausting of the foul air from the room, it would not be noticeable in so far as the work is concerned.

The whirling of machinery and pulleys does not produce a draught, but only agitates the air and does not expel it from the room, or draw in the air from the outside, and the only remedy is to exhaust the air from the room in order to secure the best results and can only be accomplished by the use of fans.

The use of humidifying machines is of great benefit, and while it would seem impossible for us to get along without them, the fan is of equal service at this time of the year and aids the machines in their distribution of moisture as well as expelling the impure air.

While the fan should be operated in the summer, it is of benefit even in winter in many spinning rooms by expelling the excessive temperature thrown off by the frictional heat from the spindles. Necessarily, the windows are kept closed in the winter and in order to be assured of pure air and wholesome conditions, the fan is the only remedy for this department.

It has always been found that water freely used on the roof of a mill in summer while cooling the upper room, also has a good effect on the air entering the windows on the lower floor; but in a mill of three or more stories in height, the greatest advantage that could be obtained would be by installing a set of spray nozzles extending same beyond jut of roof and allowing the spray to fall next to the open windows. The finer the spray, the better the results, and if used in connection with the fan it is particularly beneficial to the work and the operatives, as it draws in the moisture through the open windows.

I remember several years ago where this system was in operation the weather during August was extremely warm and unbearable, but the carding and spinning rooms were not affected to any extent by the high temperature outside, and, excepting the debilitating influence of warm weather on the operatives, we had no trouble in our work running satisfactorily.

My experience in the south during the summer of 1904 demonstrated the value of both fan and water, for, while the temperature would rise to a high point, it would not be noticed or realized by a person on the outside owing to the air being dry and free from sultriness which is prevalent in New England. Inside the mill, however, it would become exceedingly warm, especially from 12 to 6 p. m., and during this time the air would become very foul, and continued hot weather for a week or more showed its effect on the operatives by a loss of energy and a fatigued appearance.

The introduction of the propeller fan and water remedied the difficulty and it was at once apparent in the general appearance of the operatives, they becoming more energetic, with a consequent better attention to work. Previous to the fans being installed, it was not unusual for the temperature to rise to 115 degrees by 3 p. m. and 120 degrees at 6 p. m., while the outside thermometor did not register over 96 degrees.

Critical Analysis of the Detaching and Piecing Processes in Combing Machines.

BY JOHN W. NASMITH, 33 Barton Arcade, Manchester, England.

It may seem to many, that such a machine as the Heilmann comber, which in its day revolutionized fine spinning and has enjoyed the favor of the fine spinners throughout the world for more than half a century, is above criticism. Yet in these searching times, even long standing service does not exempt either men or machines from critical investigation of their actions and it is perhaps well that such examination should take place from time to time.

It is proposed in the present paper to examine analytically the detaching process in combing machines and its bearing on production, the piecing and its influence on the yarn and sliver and the theoretical considerations that have to be taken into account with reference to the amount and quality of waste taken out of the cotton in the combing process.

It is doubtful if any machine will ever be invented, that will comb cleaner than a well made Heilmann machine, for its work in this respect is almost perfect. But in other respects its performances are not quite so satisfactory.

In Heilmann's French patent, dated Dec. 17, 1845, he gives a most interesting descriptive memoir, which contains, not only a precise statement of the principles underlying the combing of all fibrous materials, but shows a variety of ingenious and original mechanical devices whereby the principles may be carried into effect and he formulates his object and aim in the following sentence:—

"It will be seen from the demonstration, that it is proposed to separate, from a lap, a series of tufts, which being combed throughout their entire length, are to be reunited again into a sliver and all this by entirely automatic means."

That is, in few words, a precise description of what happens in all combers, but it must be noted that nothing is said about the regularity of the sliver built up of the reunited tufts and yet this is a most important point. The introduction of the words "perfectly regular" before sliver would complete the description. But the production of a "perfectly regular sliver," in the strict sense, is what no Heilmann comber has as yet accomplished, nor is it likely that it ever will. Certainly the resulting sliver is within the domain of practice, otherwise the machine could not have survived, but even this is questionable when the staple to be dealt with is only one inch long or less. No doubt in Heilmann's time, the combing of such cottons was never considered.

Everyone using combers, is familiar with the cloudy appearance of the Heilmann sliver as it leaves the draw-box of the comber and this cloudiness is still visible even when combing the longest cottons and becomes more and more conspicuous, the shorter the staple used. It arises from the shortness of the overlap of the tufts when reunited.

I show two slivers of the same cotton (1 1/4 inches Egyptian); one from the front roller of a Heilmann draw box and one from that of a Nasmith comber. It should in fairness be remarked, that the draw-box of the latter has four lines of rolls compared with only three in the former. But the addition of a fourth line will not make irregular slivers into regular ones, it only facilitates a higher draft. It is hardly necessary in the presence of practical men to labor the question as to which of these two slivers will make the evenest yarn. In the subsequent drawing process, the cloudiness

is lost to sight and its injurious effect mitigated by frequent doublings, but although invisible its presence is undeniable and it is only extended over a greater length. The unevenness of the Heilmann sliver is the worst kind of irregularity to deal with, as the variation is great in very short lengths. A variation, even a great one, that extends over say three yard lengths, soon loses itself by doubling and drawing and a fair average yarn is the result. But the variation in yarn caused by large variations in very short lengths is not discovered by the usual methods of testing either in the yarn or in the sliver. For instance, a sliver may vary enormously from inch to inch and yet show no abnormal variation when weighed in three yard lengths. The yarn, however, shows it in strength and in appearance, but more especially when tested on an automatic Moscrop yarn tester, which tests the single thread in definite lengths of about twelve inches.

The manner in which the Heilmann comber detaches the tuft, combs the tail by the top comb and makes the piecing and separation, may now be examined as briefly as possible.

The forward motion of the detaching rollers may be divided into three periods. (1) The starting up of the rollers to full speed. (2) Rotation at full speed during the time the leather roll is in contact with the fluted segment and (3) bringing the rollers to a stand still, after this contact has ceased.

Now, the leather covering of the leather roller is rapidly deteriorated, or even destroyed, if it is allowed to come in contact with the fluted segment before it has acquired the same surface speed as the cylinder and the following considerations will show why it is not practicable to construct a durable cam that will overcome the inertia of the rollers and get them up to the required speed in less than one-sixth of their revolution. Let it be assumed, that the speed of the comber is 100 beats per minute. During 22/40 of each of these 100 beats the rollers are stationary, during the remaining 18/40 or in less than half a revolution of the cylinder, that is, 0.075 of a second, at 100 beats, they must perform the following evolutions. They must start backwards and stop, then start forward, attain a speed of 530 revolutions per minute for the leather roller and 480 for the steel roller, maintain this during 34 degrees of a revolution of the cylinder and then come to a standstill. Hence the roller must start gradually and the important point to notice is, that in doing so, it takes forward 0.47 inches of the tail on which the piecing is to be made, before the detaching operation commences, when it measures barely three-fourths of an inch in length. At this point the leather roll, moving at the same surface speed as the cylinder, comes in contact with the fluted segment and snatches a tuft from the end of the lap through the top comb. The sudden jerk and tension put on the fibres is better imagined than described. It is to be further observed, that the tuft is not seized by the extreme tips but about 3/8 of an inch from the end, right in the body of the lap where it offers the greatest resistance to drawing. These two facts limit the production of the Heilmann comber, for if a heavy lap be used, the leather roll driven by friction only, is incapable of pulling so much material through the top comb in so short a time and simply stops. If greater weights be applied, the roller deflects especially on the wide machines and long waste is made in the middle of the lap.

When the roller comes in contact with the fluted segment, it seizes and draws forward every fibre nipped, but every one of those whose tips just fail to reach the nip remain in the lap end. It is, therefore, obvious that the length of the detached tuft can never exceed the length of the staple used plus the length projecting to the left, beyond the nip of the roller on the segment, which measures from 3/8 inch to 1/2 inch (3/8 inch will be taken for the purpose of this investigation.) Thus for 1 1/4 inch cotton, the greatest possible length of the detached tuft is 1 3/4 inches, a maximum rarely reached, 1 5/8 inches being the usual limit. On this short tuft two piecings have to be made, one before and one behind and from what has preceded, it is obvious, that an overlap of more than 3/4 of an inch is not possible. In practice, with 1 1/4 inch cotton this maximum is never reached, and if it were, it is still much less than the distance from center to center of the draw-box rollers. Hence arises the cloudy sliver previously referred to. It may be here remarked, that in the early days of combing, the backward motion of the detaching rollers was just half the forward motion. The piecing was much improved by Mr. John Hetherington's patent of 1869, when the backward motion was increased as much as possible and the overlap carried to the utmost limit possible on a Heilmann comber.

The separation may now be examined. During the second period or time of contact the segment revolves through 34 degrees, corresponding to 1 1/4 inches of its periphery, this length passing below the roller. It is just sufficient to pull the fibres, whose extreme tips are nipped by roll and segment through the top comb, but is insufficient to complete the separation, which is done from the nip between roll and roll. The minimum distance between this nip and the top comb is 1 3/16" nearly; the diameter of the roll being 13/16 of an inch. But many fibres pulled forward by the contact of roller and segment are shorter than this and do not reach to the nip between roller and roller and are not clear of the lap end just in front of the top comb, where they are retained by friction with their fellows, tightly wedged in the comb and are inevitably carried into the waste by the next passage of the cylinder needles, since they are not held by the nipper. This is the frequent source of the long fibres found in the waste of Heilmann combers and explains why it is impossible to comb short cottons on the Heilmann, except with excessive waste, which is of course, the chief factor in the cost of combing.

Since the roller while in contact with the segment must maintain the same surface speed, it cannot be left longer in contact without shortening the third period during which the system of rolls has to be brought to a standstill and a durable cam cannot be made that will check the momentum and stop the rolls in less time than at present. To increase the amount of the forward revolution, entailing, as it does, a corresponding increase in the backward rotation is seen to be also impracticable so long as the total length of the detached tuft is only 1 5/8 inches and the overlap 5/8 of an inch. This short overlap is insufficient to retain the hanging tuft, if it is allowed to depend further

from the roller than at present, especially seeing that the overlap is merely a superposition without thorough amalgamation by drawing.

After the leather roller has quitted the segment, it continues to revolve a little, completing the separation whilst coming to a standstill. It takes the end into the rollers and there remains stationary during 22/40 of a revolution of the machine. The rolls then move backwards delivering 1.45 inches to provide the end for piecing and overlap and the cycle of operations is repeated.

From the preceding observations, it appears that the detaching, piecing and separation on a Heilmann are precisely and perfectly designed to deal with detached tufts averaging 1 5/8 inches long.

Two other points may be incidentally noticed. The cushion plate is held by strong springs in the positions shown and is compelled from this position by the descent of the top knife, which strikes it with a sharp hammering blow from 90 to 100 times per minute, necessitating a cushion of some kind to prevent damage to the cotton. Next the path described by the point of the nipper, if continued too far, intersects the periphery of the cylinder and damages the needles, a result frequently occurring by reason of neglected roller laps on the feed roller.

Having now investigated the limitations of the Heilmann comber, the detaching, piecing and separation processes in the comber with which my name is connected may be similarly examined. Its chief characteristics were outlined in a paper read before this Association by the late Mr. Jos. Nasmith, in the spring of 1902.

The chief points to be noticed are:—(1) The fluted segment is abolished and the detaching is done by a pair of rolls. (2) The nip between the rollers is the only one used and makes both the detachment and the separation. (3) During detaching and piecing the top comb, the nipper and the axis of the feed roller are not stationary, but move towards the nip of the rollers. (4) The separation is only commenced by the revolution of the rolls, just as they are stopping and is completed by the withdrawal of the top comb and nipper, thus economizing the revolution of the rollers and saving time as well. (5) The forward movement of the nipper and top comb permits a tuft four inches long to be detached each nip instead of only 1 5/8 inches. (6) The time during which fibre is being drawn through the top comb, includes the separation time and is 3.7 times as long as in the Heilmann. This is a vital point, as it explains how the high production is obtained without loss of cleaning power and may now be further elucidated.

Suppose the end of a lap held by a top comb be presented to a pair of revolving rollers. The latter will draw off all the fibres whose tips reach into the nip of the rolls and if the top comb and lap end be moved gradually towards the rolls, the fibres will be successively seized and drawn off into a long tuft, whose length will depend on the relation between the speed of the rolls and the advance of the lap. This is what takes place in a Nasmith comber. The nipper and the axis of the feed roller advance with the top comb, all three being carried on an oscillating frame, actuated by a crank, whose motion has the advantage of diminishing the speed of the advance as the full thickness of the lap approaches the rollers.

The forward revolution of the detaching rollers can only be divided into two periods, as they simply start up and then slow down, exactly as the piston of a steam engine under the guidance of the crank, which produces the smoothest reciprocating motion known to the engineer. There is thus no middle period, when the speed of the rolls must remain constant and there is consequently no irksome restriction in surface speed. The absence of this restriction permits the use of a smooth, quiet detaching cam for operating the rollers, which is the only cam in the Nasmith comber.

When the rolls are just completing their backward rotation there is no danger of the long end being carried down to the waste owing to the length of the overlap and its complete amalgamation with the preceding tuft by drawing. The starting up of the rolls is much more gradual than in the Heilmann and the pluck and sudden tension put on the fibres is greatly mitigated. It will be further noticed that the lap is seized by the extreme tip, where it draws easily, thus further relieving the strain and fully two inches are still depending from the roller on which to make the overlap.

In order to prolong the detaching process as much as possible, the top roller is slowly moved away before the advancing comb until the latter reaches the end of its path. Here the top comb and nipper are practically stationary, the crank that drives them being on the dead point. The speed of rotation of the rollers is decreasing, but the motion has not entirely ceased and they continue to deliver about 3/4 of an inch after the top comb and nipper have reached the end of their path. This latter movement commences the separation, which is completed by the withdrawal of the comb and nipper. The rolls have drawn off a tuft four inches long as compared with 1 5/8 inches in the Heilmann, or nearly 2 1/2 times as long, if the whole length of the respective tufts is taken into consideration. But in order to compare properly the number of fibres moving in the needles of the comb at any one instant in the two machines, the length (1 inch) of the tuft projecting beyond the comb must be deducted, reducing the lengths respectively to 5/8 of an inch and 3 inches.

If the weight of lap and speed of the rolls were the same in both cases, the number of fibres moving in the needles of the top comb at any one instant would be 4.8 times as many in the Heilmann as in the Nasmith, but in the latter machine the lap is double the weight so there is only 2.4 times as many moving in the Heilmann.

Next comparing the speed at which the fibres pass through the top comb it is seen that 5/8 of an inch of fibre passes through the Heilmann comb while the cylinder revolves through 34 degrees of arc. In the Nasmith 5/8 of an inch, drawn into three inches, passes through the comb while the cylinder revolves through 126 degrees of arc. Consequently, in the Nasmith 5/8 of an inch of lap, double the weight of the 5/8 of an inch of Heilmann lap, passes through the comb each nip but takes 3.7 times as long to do it. From this it is clear that there are moving in the Heilmann top comb at any instant, more than double the number of fibres that are moving in the Nasmith. But the bulk of fibre sticking in and held by the comb in the latter is greater than in the former and both of these facts, the light

fibres passing and the thick mass held, contribute to make cleaner work, so long as the lap is not so thick as to hinder complete penetration of the comb.

The forward motion of the Heilmann rolls is 1.08 inches in excess of the backward motion, while in the Nasmith it is 1.84 inches. If the latter produces double the former, this excess should be 2.16 inches to give the same thickness of fleece, but the greater relative overlap in the Nasmith takes up the difference and so the fleece looks thicker and is thicker than in a Heilmann.

It remains to show how easily the length and consequently the amount of waste can be altered in the Nasmith. Two set screws serve to displace the whole of the nippers simultaneously, carrying with them the top combs and feed rolls, which immediately lengthens and increases the amount of waste. No further complicated adjustments are required.

It may be further noted that the lower nipper jaw is a fixture on its framing and once set cannot be made to touch the cylinder and the closing of the nipper is very silent and gentle so that no leather covering or other cushion is needed. The smoothness of all the motions permits a speed of 100 nips almost without noise. The gratifying reception afforded to the machine by spinners all over the world is attested by the fact that since April, 1902 to March 31, 1905, 441 machines have been made and delivered.

Batten and Hayes Additional Top Stripper on Revolving Flat Card.

BY WILLIAM HAYES, Auburn, Me.

The Batten-Hayes device is simply an additional top stripper on the crown of cylinder; the tops strike the back of cylinder as usual and cards as usual until they reach the crown of cylinder at which point the tops leave the cylinder in the regular traverse and pass up over an arch or bridge, and are stripped as they proceed and then return to the cylinder clean and are stripped the second time at the end of the last half of the carding service.

Our additional stripper on top of cylinder takes out larger leaf and removes a much lower grade of strippings than the regular card does with twice the carding surface. The first half cards the cotton, the last half, the top traverse on cylinder more than cards it and to some extent combs the cotton and makes a special preparation for combed work, the staple being cleaner and more of the fibres laid in parallel.

This extra stripper enables us to run our tops one third slower and at the same time, the tops and cylinders are kept cleaner.

In using stock from cards equipped with this additional top stripper, intermediates and flying frames run with less stoppage. One fly frame on a test ran five hours without breaking any ends and the drawing and roving is much cleaner and more even. Similar results occur in spinning, where the work runs much better and the yarn is cleaner, more even, and tested stronger.

Both mule spinners and warp spinners noted marked difference in the work, and there was about half the usual amount of flyings on the mule carriages and on the spinning frame guide wires, boards and under clearers were more free. Similar advantages occur in the spooling, warping, and weaving, both in the run of the work and the results are as indicated by the samples of cloth and sliver accompanying this paper for the inspection of the members.

The Barber Warp-Tying Machine.

BY E. W. THOMAS, Columbia, S. C.

Probably no one department in our weaving mill presents from the nature of its operation, more nerve destroying action affecting the operative than we find in the drawing-in of warps. The employee on this class of work has but very little opportunity for bodily exercise and it is the only process in the mill requiring persistent attention to the work of the hands and the watchfulness of the eye. And of late years, particularly since the introduction of the backstop motion, and the increase in the numbers of harnesses used, there has been and still exists in nearly, if not all mills, throughout the country a scarcity of skilled help for this particular department. As a partial remedy, the system of twisting-in has to some extent been adopted, chiefly from the fact, that male help could be obtained in limited numbers for this purpose. This solution of the problem, however, has not come into general use in this country for various reasons, which are unnecessary to relate in this paper.

Those manufacturers who are located in the North are to some extent aware of the fact, that efforts have been made to devise a machine for drawing-in, not so much to cheapen the cost, as to relieve the mills of the uncertainty at all times of being able to obtain females in sufficient numbers, to draw in the warps in the usual way. And credit should be given to those men who have succeeded in inventing and building machines that will do this work. It would seem, however, that any machine now in use from the necessity of the case be limited in its service, if it cannot be used universally in a mill having a variety of kinds of harnesses, and backstop motions.

Within a few months, a machine has been devised that overcomes many of the objections of the drawing-in machine of today, and the following are the claims made for it: First, the adaptability for tying knots in the ordinary range of yarns; second, no special if any changes are needed to change the machine operating on warps containing various numbers of threads per inch; third, the fact that it makes no difference as to the number or kind of harnesses used or whether backstop motions are used; fourth, that it displaces to a great extent the ordinary hand process of drawing in.

The first of these machines built to be operated in a cotton mill was put in use August 3, 1904, and has continued in use until the present time. So successful were the results obtained that a second machine was placed in same mill about October 1 of the same year.

The broad principle of the machine is to tie the ends of the last of an old warp to the correspond-

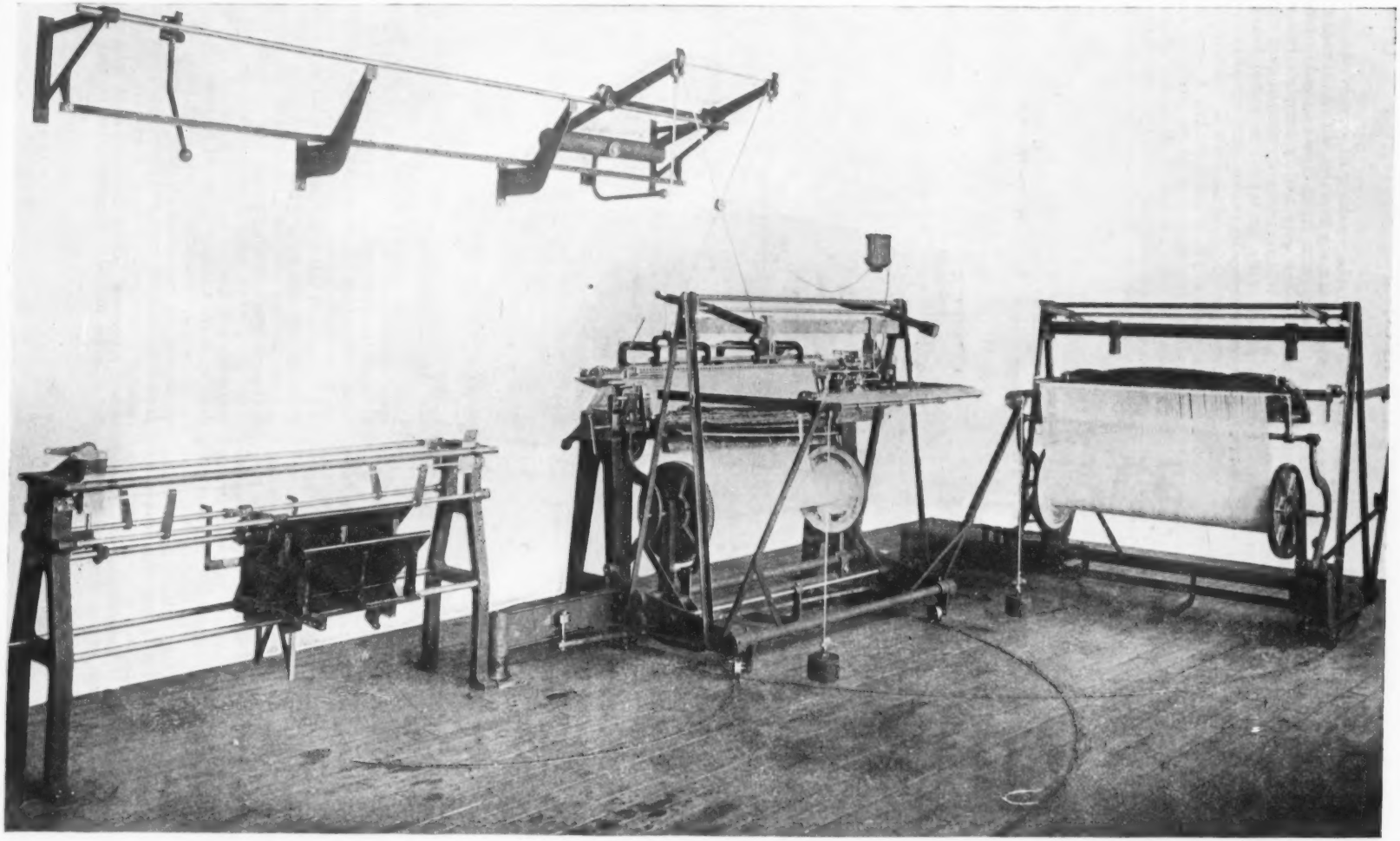


FIGURE 1. — ELEVATION OF LOADER, MACHINE, AND WARP TYER.

ing ends of a new warp, on the same principle in general that "twisting-in" is now done, but in a very much more satisfactory manner, in that the ends are tied instead of being twisted. The most remarkable features of the machine are its rapidity of action, its correctness and the slight attention needed to operate, and last of all, that no special

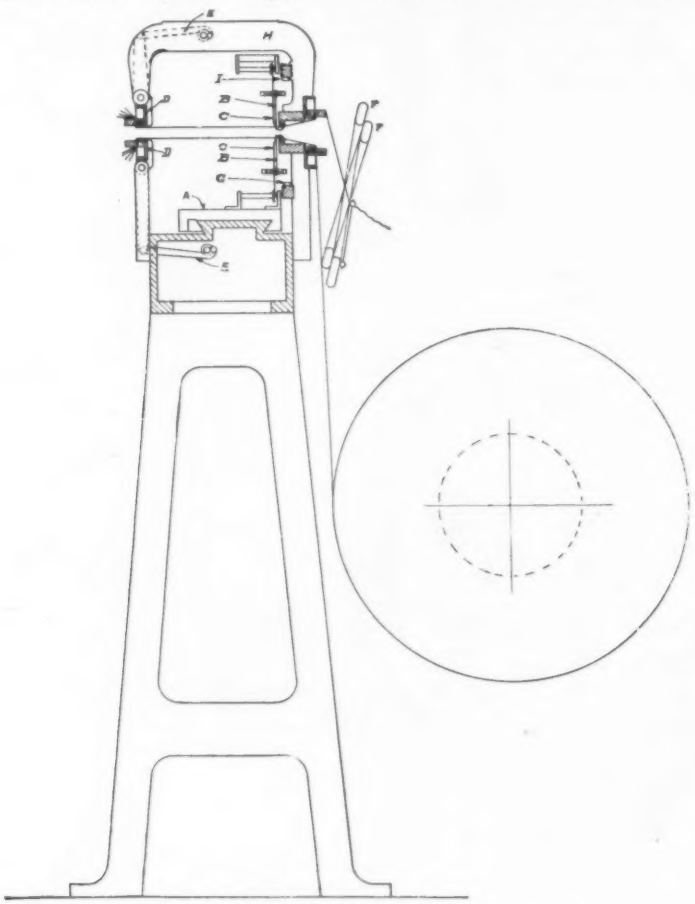


FIGURE 2. — CROSS SECTION OF WARP TYING MACHINE.

preparation of either the ends of the old warp or those of the new one is required.

The threads are automatically tied and the ends cut off by means of the same principle that is used in the spooler knotter, which nearly all of you have in use in your spooling rooms.

In this machine the knotter is speeded to tie about 250 knots per minute, so that in a warp having 2,000 ends, only eight minutes are consumed in tying the old and new warps together. In the mill above mentioned, where the two machines are being operated, warps are changed in less than two minutes. In other words, from the time the last knot is tied on one warp until the machine is ready to start in on another, the time occupied is not over two minutes, and oftentimes less. Within a few weeks one of our ex-presidents of this Association timed the working of one of the machines which was tying in warps with 2,500 ends of No. 28 1/2 warp yarn on 42 inches spread in reed and five full warps were tied in complete in less than an hour. When warps are removed from machine they are ready for loom. As stated before, these two machines have been in operation for some months, and have supplanted in the amount of work they perform, the former requirement of from twenty-four to twenty-eight girls employed on hand drawing-in.

The warps in this mill have twine harnesses and backstop motions, and are used on Draper looms.

This machine practically overcomes the objection sometimes made of the excessive cost of drawing-in, when using backstop motions, and it certainly is a great cost saver to those who are drawing-in on a large number of harnesses.

The standard machine as made will tie-in warps up to and not exceeding 46 inches in reed and is geared up to work from and above 30 threads per inch. No more waste is made, if as much, as in ordinary processes. These machines have been seen by a large number of manufacturers and pro-

nounced a most wonderful machine, and one that will strengthen the mill in a place where difficulty is experienced in obtaining sufficient help. In as few words as possible I will try to follow the complete operation of the machine.

The first step is the taking out of the loom the last end of the warp after all the cloth possible has been woven. Previous to taking the harnesses from the loom, a slasher comb is put in the warp just back of them, or, in case back stop motions are used, in back of them, and the comb is then drawn towards the whip roll. Between the whip roll and the slasher comb are placed two wooden clamps, one above and one below the threads. These clamps are lined with felt, and hold the threads by tongue and groove action, keeping the warp ends fairly parallel.

The next operation is to cut the cloth front of reed, leaving about two inches in length, simply to maintain the ends of the old warp and prevent their slipping through the reed and harnesses. After this, this portion of the warp extending through the reed, harnesses, and back-stop motion, if used, is all removed and placed on truck preparatory to removal to the drawing-in room.

The next process is to remove this piece of warp from the truck for the purpose of cleaning harnesses and reed from the lint that has collected on them. After cleaning the harnesses they are hung upon racks and then are ready for use.

The floor space is about 20 by 30 feet, and the custom is generally to erect on two sides (if the location of machine is in corner of mill or room) a partition at any convenient height, say, about 8 feet. The machine has as its accessories two beam trucks, one loader, and an overhead carrying frame for conveying the old piece of warp from the loader to the machine proper. The beam trucks are arranged to travel in a path as shown by the curved lines on the floor. These accessories are not strictly necessary to the perfect working of the machine, but are furnished with the machine by the builders in order to be able to change the warps in an easy manner and to economize time. The loader is used to fix the old warp in position preparatory to placing upon the knot-tying machine, and is conveyed to that machine by means of the overhead track represented in Fig. 1, which is attached to the wall or partition, as the case may be, and is located overhead and directly in rear of the loader and the machine. The new or full warp from the slasher is brought in the room and placed in either one of the beam trucks and swung around so that its sheet of threads may be brought into the machine and securely fastened preparatory to placing the old warp in the machine. Then the sheet of the old warp is placed over and directly above the sheet of the new warp. These may be clearly noticed in Fig. 2.

The machine is now ready to operate and is started in motion by throwing a switch, and the threads of the two warps are tied together and the ends, after tying a knot, are cut off. During the process of the traveling head traversing between

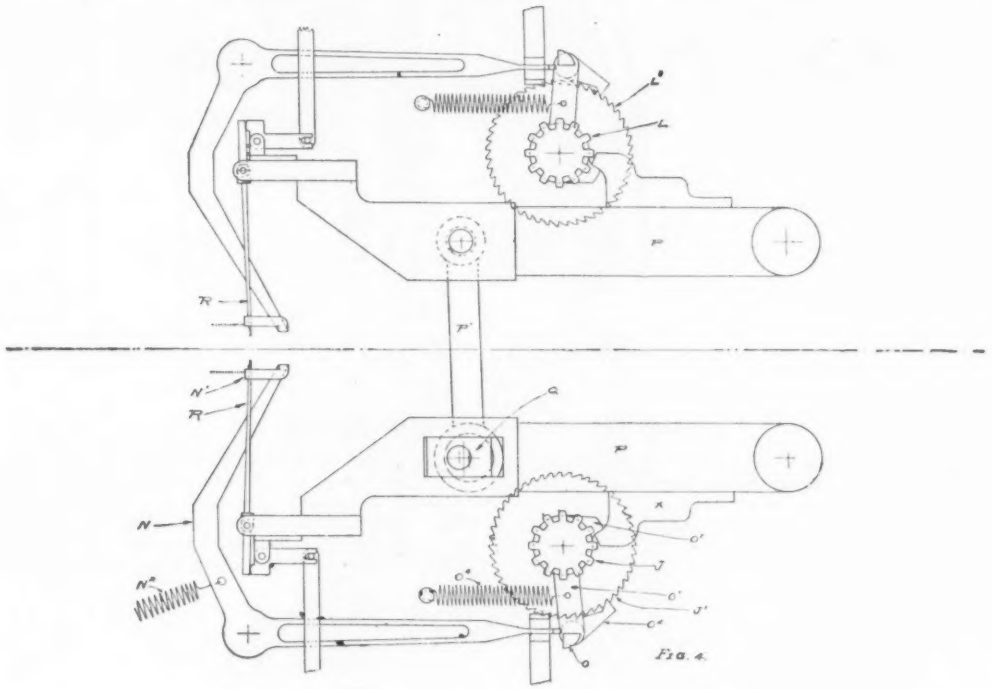


FIGURE 3. — SHOWING FEED AND SELECTOR MECHANISM.

the two sheets of threads and the tying of them together, the warp previously tied in, which, when removed, was in the other beam truck, is being handled by the operator in drawing the harnesses and reed and back stop motions, if any, along over the knots that have been tied. At this time should there be any broken threads discovered, these are attended to, after which the beam is removed from the truck to the regular loom beam truck, and is then removed to the weave room.

One employee can without assistance from others make this change of taking out and replacing a warp, and during the time the machine is tying in a warp, ample opportunity is given to prepare the warp to be tied in.

The following description of the machine it is hoped may be so explicit as to make the general working of it clear.

Fig. 1 is a general view of the machine and accessories.

Fig. 2 is a vertical, central, cross-section, showing the relative positions of the machine, warp, and the harnesses; also indicating the location of the selectors and feed levers. The old warp is shown clamped in the warp carriage, the new warp in its clamps on the bed of the machine. The warp beam is supported in the beam truck. In this figure, A refers to the knotter carriage, B to the selectors, C to the feed levers, and E to the toggle levers, by means of which the warp clamps D are operated to stretch the warps. FF are the harnesses suspended upon the old warp. G is a rack bar secured above the bed by means of which the knotter carriage is fed along said bed. H is the carriage for the old warp to which is fixed the rack bar I extending parallel to the rack bar G. This permits a play of the compensating feed mechanism whereby the old warp carriage is given a movement backward and forward to compensate for the different spacings of the threads in the two warps.

Fig. 3 is a side elevation showing only the feed

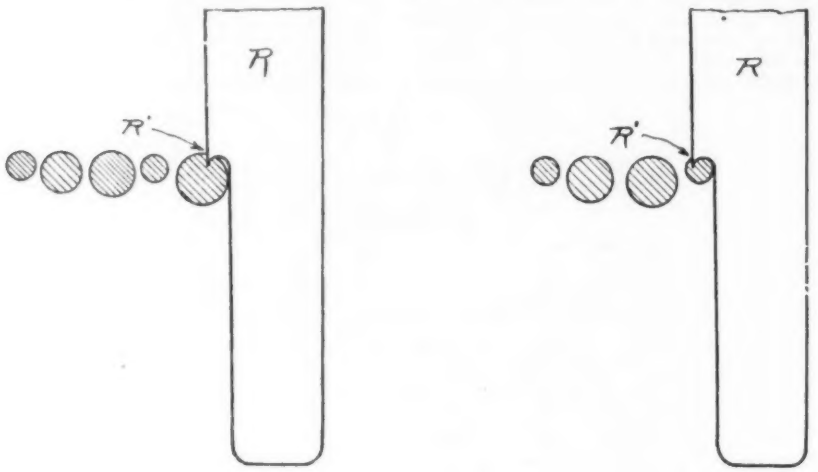


FIGURE 4.—ENLARGED VIEW OF THE SELECTOR.

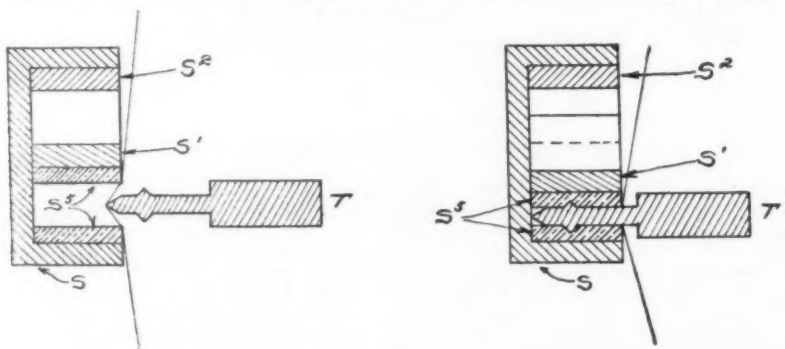


FIGURE 5.—INSERTION BARS.

mechanism and selector mechanism; the other parts being omitted. J is a pinion secured upon the shaft of a ratchet wheel J. This pinion is adapted to mesh with the rack bar G (see Fig. 2) and by its rotation feeds the knotter carriage along the bed. L is a pinion of the same size and pitch as the pinion J, said pinion L being secured upon the shaft of a rachet wheel L^1.

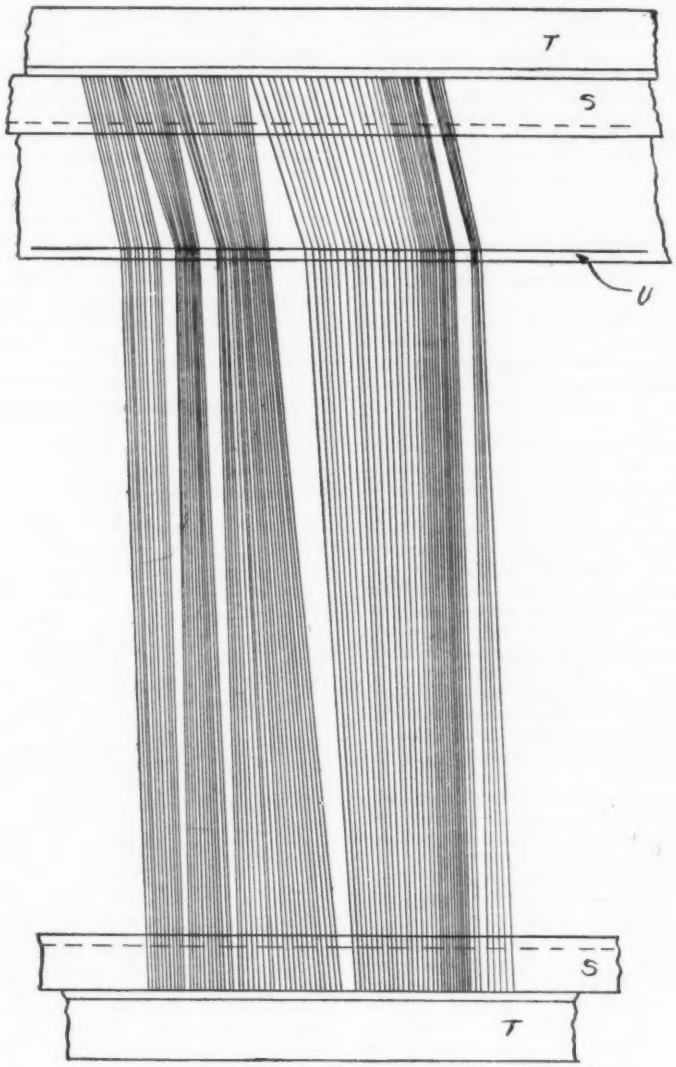


FIGURE 6. — SHOWING PIECE OF WARP.

The sensitive mechanism for feeding the knotter carriage, and for operating the compensating feed, will next be described. Inasmuch as these mechanisms are identical, the description of the first will answer for both. The sensitive feed lever N, of "L" shape, is pivotally mounted upon the knotter carriage A, in such a position that its upper end, which terminates in the offset finger N^1, encounters the foremost warp thread. The opposite end of the "L" shaped lever lies in the path of a segmental stud O, fixed upon the bell crank O^1, said bell crank being oscillated by means of a finger X. mounted upon the selector arm P, and bearing against one arm of the bell crank O^1. The spring O^4 tends to move the bell crank O^1 to the left against the action of the finger X. O^1 carries at the outer end of its other arm a pawl O^2, said pawl being adapted to engage the ratchet wheel O^3 which has a fixed connection with the pinion J. The oscillatory movement of the pawl O^2 is not

positive, and when the segmental stud O is engaged by the arm of the feed lever N, the movement of said oscillatory arm O^1 and pawl O^2 is so limited that the pawl will not take a tooth on the ratchet wheel O^3. When the finger N^1, of the sensitive feed lever N, is engaged by the warp thread, the opposite end of said lever will be in the path of said segmental stud O, and limit the oscillatory movement of said stud and the arm O^1, so that the pawl O^2 does not take a tooth on the ratchet wheel J^1 L^1. When no warp thread is in position to engage the finger N^1 of said feed lever N, the opposite end of said feed lever is held elevated (by the spring N^2) so that said feed lever is withdrawn from the oscillatory path of the stud O. This permits the pawl O^2, carried by the arm O^1, to oscillate sufficiently to take a tooth on the ratchet wheel J^1 L^1 and rotate said ratchet wheel and the pinion J. The rotation of the pinion J feeds the knotter carriage towards the warp threads that have not been tied, thus accomplishing the purpose of the feed.

The upper compensating feed moves the old warp carriage sometimes faster and sometimes slower than the lower feed moves the knotter carriage, but as hereinbefore stated, both are actuated by the absence of warp threads at the selectors.

The selector mechanism is also shown in this figure. The selector levels PP are oscillated synchronously toward one another by the eccentrics Q. The upper lever is connected to one of said eccentric by means of a link P^1. The forward ends of the levers PP carry the selector RR, upon the end of each of which is provided a hook R^1, Fig. 4. The oscillatory movements of the pivoted selector levers PP impart a corresponding inward and outward movement to the selectors RR; the hooks R^1 R^1, of said selectors, being reciprocated across the plane of the warps. The selectors move inwardly and outwardly together and their hooks engage a single thread from each warp upon each inward movement of said selectors. The selectors are pivotally supported upon the free ends of the selector levers.

Fig. 4 shows enlarged end of selector and indicates how a selector hook too small to take two threads will, nevertheless, take a thread much larger than normal because of its spearing action.

Fig. 5 is a cross section first showing the insertion bar entering and then clamped in position.

Fig. 6 is a plan view of the lower warp showing it as it is held in the clamp frames SS, by the insertion bars TT. This is also shown in figure 10. The warp is clamped in the frames SS, stretched over the ribbon U, which ribbon is then given a longitudinal movement, drawing the threads to one side and leaving them in a position better adapted to resist the pressure of the selector and feed lever than would be the case if they passed straight across.

This figure also shows the irregularity of spacing (somewhat exaggerated) that may exist in either or both warps without interfering with the proper action of the machine.

At the Massachusetts mills in Georgia, where one of these machines has been in operation for some months, the actual saving on the pay-roll is stated by the management to be $50.00 per week and in making this statement the following details were given:

In eleven hours 81.4 warps of 1,730 ends each of number 12's yarn were tied in at a cost of $7.77, which includes cost of the attendance, interest on investment, the value of waste, power and oil, as well as the cost of repairs, which equals 9.54 cents per warp as against 20.19 cents per warp by hand.

At the mill referred to as having two of these machines in operation for some considerable time, the work performed during the month of March, 1905, on the knot-tying machine cost 11.49 cents per beam, as against a cost of 28.66 cents per beam for drawing-in by the ordinary process. It is only fair to state, however, that the two machines were not in use all the time, on account of waiting for harnesses and warps, and at same time the attendants were receiving full daily wages, and I believe under normal conditions the cost should not be over 9 cents per beam.

Within the past few months several of these machines have been put in operation in various mills on different classes of goods, and in all cases there has been expressed complete satisfaction as to the work performed.

Progress in the Development of the Electric Drive.

AS EXEMPLIFIED BY A WEEK'S TEST ON SPINNING FRAMES.

BY SIDNEY B. PAINE, Boston, Mass.

"The scrap heap is the foundation of American progress." It expresses most eloquently dissatisfaction with present attainment. It proclaims that that which has been accomplished is merely a step in the progress of development. The history of the textile industry bears abundant witness to the truth of this statement. Recognizing its force, you have offered every encouragement to the inventor to put forth his best efforts. You have afforded him every facility to explain his invention before practical men. By your suggestions and advice you have assisted him in its perfection. It is this liberal and progressive spirit which has placed America in the top-notch of manufacturing countries.

In April, 1895, it was my privilege to present a paper before this Association on "The Electrical Driving of Textile Establishments." In that article a general description was given of the system and methods which had been adopted in the first textile mill in this or any other country, to be driven electrically throughout. At that time, this first mill had been running about nine months. It is a pleasing coincidence that at the present meeting we are to have a report from this mill. Much progress has been made during these ten years. The writer has a record in detail of 128 different textile corporations which are using about 90,000 horse power of electric motors. It is a conservative estimate that approximately 175 textile mills in this country are using electrically about 140,000 horse power. The census of 1900 showed that 1,165,048 horse power was used by the cotton,

woolen, worsted and silk mills in the United States. Assuming an increase in the last five years of 25 per cent. we find that about 10 per cent. of all the power used in these industries is obtained from motors. When we consider the fact that, at the outset, the electric system was as new to engineers as to the manufacturers, we can understand why the progress has not been even more marked. It may be of interest to analyze the above 90,000 horse power of which the above record has been kept in detail. Fifty-four thousand (54,000 h. p.) horse power is generated by steam, 33,000 horse power by water-power and about 3,000 horse power by water and steam combined. Forty-two (42) new mills have been built in which the electric drive was adopted at the outset. In 28 of these 42 mills, the energy is generated by steam and in 14 by water-power. Most significant, however, is the large number of mills which are operated from central power stations. Twenty-two (22) mills are thus driven entirely by current generated by an outside and independent corporation, while twenty-two (22) mills purchase 5,586 horse power to supplement the power generated upon the premises. This indicates very clearly the tendency toward "Centralization of Power," which the writer has advocated for several years. This movement has not been confined to this country, for in England two large power companies have been organized, in Yorkshire and Lancashire respectively, which are soliciting business from the textile mills. Two years ago a prominent English manufacturer remarked to the writer, "We have been watching your progress in America, and believe that your experimental work is nearly completed. We are about ready to adopt your system." The signs are not lacking that they are on the eve of a forward movement in this direction. In all its essentials, the system followed today is the same as that adopted ten years ago. In some few details, improvements have been made. The principal change has been in the direct connection of the motor to the spinning room shaft. In the first mills this arrangemnet was adopted for the picker room only. There has been a marked advance, however, in the recording and indicating instruments. At first we had to depend upon the ammeter and voltmeter. The use of these instruments was found to be unsatisfactory, as the readings of the ammeter had to be corrected by the readings of the voltmeter, and did not even then give a correct indication of the amount of energy furnished by the motor. The use of the indicating wattmeter corrected this difficulty, but no continuous record could be kept by that instrument. Then followed the curve drawing wattmeter, by which the record was drawn by a pen on a revolving disc. This was open to the objection that its record, especially on light loads, was too short to be of much service. The latest instrument to be developed is the registering wattmeter, by which the record is drawn upon a strip about 3 inches wide, as the rate of 3 or 6 inches per hour, as may be desired. The duration of this record depends upon the length of the strip.

The several charts are photographs of results obtained during the test of a fine goods mill. The speed on each strip was such that 3 inches passed under the pen in one hour. From this may be determined the scale to which the camera has reduced the record. Fifty (50) such continuous curves were taken in this mill, each representing the record of half a day. In addition, five special tests of shorter duration were made. A recording wattmeter was also connected in the circuit to record the total energy, and an indicating wattmeter was used to give instantaneous readings at ten minute intervals and to check the registering wattmeter. Careful record was made of temperature outside and also inside the mill and of the humidity both relative and actual. Memorandum was made of all particulars connected with the machinery driven. Great difficulty was experienced in determining the actual number of machines in operation at a given moment, but especial care was used to have the record as accurate as possible. The curves given below are the record of a run for a Saturday morning and the first five days of the following week, of a 200 horse power motor in a ring spinning room, and indicate the current delivered to that motor during the period. The "friction load," so called, was ascertained for comparative purposes only, as it cannot be accepted as giving the actual efficiency of the drive, for, as has been explained several times by the writer, it indicates merely the energy consumed under conditions which do not prevail when the machinery is in operation. When the belts are on the loose pulleys, the stress and torsion on the shafting and the slipping and especially the creeping of belts are quite different from what they are when all the machinery is running. The writer knows of no method which can determine accurately the friction losses of a system, either mechanical or electrical, under working conditions. As stated, the friction load tests do have a comparative value, however, for they detect any change or undue losses from day to day. No importance has been attached to the tests of portions of machinery to determine the power required for a single frame or number of frames. Such a test depends for its value upon the assumption that all the machines of the same description consume the same amount of power. This is manifestly an incorrect hypothesis, especially on spinning frames. What we are all interested in, is the amount of power required to run a room or a section containing a given number of spindles, together with the necessary shafting and belting.

[An interesting series of tables and charts accompanied this paper and we regret cannot be reproduced here.—Ed.]

Electrical Measurement of Power in Manufacturing Heavy Cotton Goods.

BY LOUIS I. GUION, Columbia, S. C.

This paper gave the results of an elaborate series of tests at the Columbia Mills Co., Columbia, S. C., which are too extensive to be given here. Mr. Guion stated that as a whole, this mill cannot be taken as a plant showing the electric drive up to its full advantages, because it was, as before stated, the first mill to have a complete equipment of motors. There have been many changes from the original plans, and there is much more shafting employed than there would be in a mill designed for economy in labor, and with the experience that has come by the continued use of years.

The question arose at the last meeting of the Association as to economy of cost in operating an electric driven mill, and on this subject, it will be observed, that no figures have been given in this paper. We believe we have stated the advantages derived from the use of the electric drive in this particular mill, and the reasons for its installation, which was done at the time of the building of the mill, on account of local conditions. As to whether the counter part of this mill, located where it could be belted or rope driven from a water wheel jack shaft, could be operated more cheaply than at present, the writer cannot say, or whether the cost of installation would be more or less; but he is well convinced that where electricity can be generated on a jack shaft in wheel room, and the mill owns its own power plant, that the electric driven mill, under these circumstances, is very desirable.

As to the electric driven mill, where current is generated by steam power, the question as to point of economy, either in installation or operation, is one yet to be presented. We have nothing in facts or figures from any cotton mill plants that lead to the conclusion that the electric drive is as economical as the hundreds of plants running that have modern steam power of the ordinary direct belt or rope drive.

We are seeking information on this point, and hope and trust the interest manifested may be satisfied with the presentation of actual figures by those in a position to give the same.

After the reading of the last paper at the Thursday afternoon session the election of officers resulted as follows:

President, James R. MacColl; Vice-presidents, William D. Hartshorne and George A. Ayer; Directors: William H. Loftus (for two years), Charles T. Plunkett (for three years), and Roscoe S. Milliken (for three years).

After the election of officers the following resolution was adopted:

"Resolved, That the association's hearty thanks be extended to our retiring president, Mr. Walmsley, for his faithful and efficient oversight of our transactions during his term of office."

In response President Walmsley spoke as follows:

Gentlemen:—I accept with satisfaction and a far greater appreciation than I can express this flattering testimony of your good opinion and good will.

I have always esteemed it a very great honor, and ever shall esteem it a great honor, to have been the president of this association. It is a distinction worthy the ambition of every member of the association.

I return, gentlemen, to the ranks none the less preferring to devote the best that is in me in the future welfare of this organization, and it now devolves upon me, gentlemen, to present to you my successor, your newly-elected president, Mr. James R. MacColl.

I congratulate the association sincerely in its choice, and I do not hesitate to predict that under his leadership as president this association will increase in usefulness, in influence and in power.

In accepting the position of president, Mr. MacColl spoke as follows:

Mr. Walmsley and Gentlemen:—I thank you very cordially for the honor which you have conferred upon me, and for the unanimity of the election.

Discussing life, you may remember that Sidney Smith has remarked that the parts in life are like holes of different shapes in a table—triangular, oblong, square and round—and that the persons who play the parts are like pieces of wood of the same shapes, but that very often the triangular person get into the oblong hole, and the square person squeezes himself into the round hole, and that very seldom the officer fits the office so exactly that you can say the one is made for the other. I hope in this instance it is not another case of the square man getting into the round hole.

I can only promise you that I will give you the best that is in me, and strive to use all my ability in thought and work for the best interests of the association.

Our association has had a continuous progress and development. In ten years the membership has been tripled, and the transactions have been doubled, and many have taken their part in this progress and development. We have had a long succession of able and active men as presidents who have swayed the association in a conservative and yet a progressive way; we have had governors who have given a great deal of time, thought and counsel to the association; and we have had an exceptional man as secretary, who during the last ten years has given not intermittent but continuous thought day by day to the association's work, and has seen that everything went along smoothly, and it seems to me to be eminently fitting that we should recognize, as we did yesterday, this long and faithful service.

A large measure of our success depends on the members themselves, upon their willingness to prepare papers, their faithful attendance at the meetings, and their active interest in the discussions that take place; and it is to be hoped that in the days to come there will be continued and increasing interest on the part of the members in the work of this association.

But like all business enterprises this association cannot stand still. Fixity is really retrogression. The world keeps moving on, and unless we keep pace with it we are out of the procession; and it seems to me that our association now has problems and opportunities for it which we must grasp.

I will take the liberty of mentioning some of these which have come to me, and leave them with you for consideration. I make no suggestion as to the solution of the problems, or as to the grasp of these opportunities, but simply put them before you.

First. Is the name of our association representative of its scope and importance, and is there not a possibility that we have outgrown it, and that we may not fully grasp our opportunity if we do not have a wider and more representative name?

Second. Shall we confine ourselves mainly or solely to the discussion of technical questions, and ignore commercial and political questions in which we are very much interested as cotton manufacturers?

We must remember that many of our members

are not very deeply interested in the technical side of our business. One treasurer was asked if he was coming to this meeting. He said, "No; I do not feel any special interest; it deals with matters inside the mills, and I am not very much interested in that." We must remember that a very large number of our members are of this class.

Then in connection with commercial matters, we had, for instance, yesterday a suggestion from Mr. Price that as an association we should take an interest in shipments and adjustments of claims on cotton. Evidently outsiders rather think that we ought to take a more aggresive part in these outside questions.

And then recently we were asked to associate ourselves with the International Congress of Cotton Manufacturers, and the Board of Governors felt it was not quite within the province of this association. I do not know whether we have any international interests, or whether we should decide that we have no need to associate ourselves in any way whatever with the cotton manufacturers' associations of other countries.

Then as regards political matters. We have the tariff coming up again very soon, and it seems to be very likely that our association might be called upon to have its voice heard in relation to this re-adjustment of the cotton schedule. At all events, our legislators in Washington must look to some association to guide them in this important matter.

We have the question of the hours of labor, which the Speaker of the House yesterday referred to as being more a national question than a state question, and it is one of vital interest to us as cotton manufacturers. Has this association any interest in the matter, or shall it decide that it is outside its province?

There is also the question of child labor in mills, which is of great importance. Also the question of taxation, which a strong representative association would have great influence in settling wisely and fairly.

All these you see are political matters, and I leave them with you to decide and to consider whether we have any interest in them in this association.

Then I think we might consider this question, in what way can we associate with kindred branches of manufacture? It is a remarkable fact that a very large percentage of the cotton mills today are now using other materials, worsted, wool, cotton and silk. On the other hand, a very large number of the worsted mills are using cotton. Men in a similar position to ours in these industries have no technical organization that they can associate themselves with—in New England I mean—and it becomes a question whether we could in any way add to the strength of our membership by having them associate with us, and in that way receive ideas from them and give them ideas helpful in their business.

There is also the suggestion advanced by a member today that when we gather at our annual meeting we have a social gathering and a banquet. That is worth consideration.

I leave these matters with you to give them your consideration and discussion, so that the Board of Governors may be able to ascertain what the wishes of the members are with regard to them.

I promise you my best service; I ask your cordial co-operation, and I thank you very sincerely.

The following new members were then elected:

For Active Membership:—John W. Allis, vice-president and agent Utica Knitting Co., Utica, N. Y.; Avery B. Clark, superintendent Merrimack Mfg. Co., Lowell, Mass; Harlan Ingalls Dennett, superintendent Hadley Mills, South Hadley Falls, Mass.; George O. Dexter, superintendent Canadian Colored Cotton Mills Co., Hamilton, Ont.; Henry C. Dresser, general superintendent Bibb Mfg. Co., Macon, Ga.; George Fish, superintendent Massachusetts Cotton Mills, Lowell, Mass.; R. H. I. Goddard, Jr., Goddard Bros., agents, Lonsdale Co., etc., Providence, R. I.; Frank Hartley, superintendent S. Slater & Sons, Webster, Mass.; Alexander F. Hobbs, assistant manager U. S. Finishing Co., Norwich, Conn.; Alexander King, Jr., assistant superintendent American Thread Co., Holyoke, Mass.; John T. Kirk, superintendent Slater Cotton Co., Box 697, Pawtucket, R. I.; Earl S. Jenckes, superintendent Paul Whitin Mfg. Co., Northbridge, Mass.; Harry D. Lord, instructor carding and spinning, Mississippi Textile School, Agricultural College, Miss.; J. D. Mallory, superintendent John M. Stone Cotton Mill, Starkville, Miss.; Harold Mowry, manager Sterling Branch U. S. Finishing Co., Sterling, Conn.; Arthur H. Paul, assistant superintendent Boston Mfg. Co., Waltham, Mass.; Albert S. Pratt, agent Edwards Mfg. Co., Augusta, Me.; John J. Rooney, assistant superintendent Tremont and Suffolk Mills, Lowell, Mass.; Lewis H. Russell, superintendent Ansonia Co., Ansonia, Conn.; Stephen E. Smith, instructor Lowell Textile School, Lowell, Mass.; Charles A. Tabor, superintendent Thorndike Mills, Thorndike, Mass.; Charles R. Thomson, assistant general superintendent Renfrew Co., Adams, Mass.; Fenwick Umpleby, instructor Lowell Textile School, Lowell, Mass.; Frank F. Wooley, superintendent Coventry Co., Anthony, R. I.

For Associate Membership:—Samuel N. Braman, engineer Westinghouse Machine Co., 131 State Street, Boston, Mass.; Howard D. Colman, president and treasurer Barber-Colman Co., Rockford, Ill.; Charles E. Eager, member firm J. Russel Marble & Co., 124 High Street, Boston, Mass.; George P. Erhard, vice-president The Geo. W. Stafford Co., Readville, Mass.; S. Harold Greene, Starch Manufacturer, 367 Atlantic Avenue, Boston, Mass.; Allen B. Greenough, Harrison Yarn and Bleaching Co., Taunton, Mass.; Edward F. Hathaway, general manager, American Warp Drawing Machines, 289 A Street, Boston, Mass.; Henry W. Mason, Cotton Dealer, 10 South Water Street, Providence, R. I.; John Parmenides, of Choremi, Benachi & Co., 50 Congress Street, Boston, Mass.; J. S. Sanford, Barber-Colman Co., 11 Pemberton Square, Boston, Mass.; E. Kent Swift, engineer Whitin Machine Works, Whitinsville, Mass.; William Warr, engineer, Robbins' Conveying Belt Co., 53 State Street, Boston, Mass.

(For additional papers read at the meeting, see page 176a of this issue.)

The American Cotton Manufacturers' Association.

As this issue is in press the ninth annual convention of the American Cotton Manufacturers' Association is being held at Knoxville, Tenn., May 10 and 11, and with a large number in attendance. The meeting was called to order by the president, R. S. Reinhardt, of Lincolnton, N. C., and the following program is to be carried out. Prayer by Dr. Edwin B. Olmstead; addresses of welcome by Hon. J. I. Cox, Governor of Tennessee, and W. H. Gass, Mayor of Knoxville. A reply to the addresses was made by Arthur H. Lowe, of Fitchburg, Mass., after which President Reinhardt delivered his annual address.

President Reinhardt's Address.

It affords me a great deal of pleasure to welcome you to this, our ninth annual convention, for the holding of which we have gathered together in the beautiful city of Knoxville, where we have been so cordially welcomed by the Governor of the State, the Mayor of the City, and the President of the Board of Trade, for and in behalf of the citizens of Tennessee in general, and the citizens of Knoxville in particular, and I feel safe in saying that in taking our departure from this city, we shall carry with us to our homes many pleasant and lasting memories of this occasion.

In looking over this assemblage, and noting that we have gathered here today gentlemen representing our industry, whose places of residence cover the various cotton manufacturing states of our country, there is little doubt in my mind but what the American Cotton Manufacturers' Association is truly national in character, and while it is not my intention to detain you by any lengthy oration what I shall have to say will deal with the broad subject of cotton manufacturing in the United States of America, and its relation to foreign fields, to which we do export our surplus raw cotton, but to which we ought rather to export our surplus in the form of finished merchandise rather than as raw material.

Since our last annual meeting, which was held in the city of Washington, the capitol of our country, the cotton manufacturing world has consumed practically the entire cotton crops of this country produced during the years of 1903 and 1904, and this supply was insufficient to prevent millions of spindles from enforced idleness, thus imposing great hardships upon the cotton manufacturing employes of this and other countries. Entailing also heavy losses to the owners of the mills.

The crop of 1904 and 1905 has demonstrated to the trade that the cotton growing states of America are capable of producing a sufficient supply to meet the requirements of the cotton manufacturing world, so that weather conditions being reasonably favorable, it is very doubtful is we need anticipate or live in dread of another "cotton famine," therefore we shall most likely have normal prices for our raw material, and it is reasonable to presume that in view of the comfortable financial condition of the cotton planter, as well as the influx of additional capital to the cotton growing states during the past five years, and the generally prosperous condition of our country, that just and equitable prices for our raw material will prevail without damaging fluctuations, even though we should produce a crop of cotton which would be somewhat in excess of our yearly requirements. The price of cotton in America has fluctuated from 16 1/2 cents to 6 1/2 cents in less than twelve months, and in this great range is to be found the fundamental reason why the demand for goods has not been satisfactory. Those who bought the manufactured product, purchased only for their immediate requirements, and by so doing were enabled to work off any stock which had accumulated in former years.

A difference in quoted prices for cotton averaging fifty dollars a bale within less than one year is palpably equally injurious to both grower and user. I think I shall voice the opinion of every person connected with the manufacturing side of our great industry when I say that the manufacturer and spinner desire stable prices much more earnestly than they crave abnormally low prices. At sixteen cents a pound for the cotton our mills use, there will always be a shrinkage of demand for cotton goods. On the other hand, it is a great mistake to think extremely low prices always mean prosperity for the manufacturer. What we need, gentlemen, more than any other one thing, is that price variations shall be confined to such limits as to enable us to conduct our affairs on business principles, rather than as in the past, to have conditions so uncertain that our daily transactions partake more of the nature of gambling than legitimate business.

Our foreign trade, which is largely for our coarser character of cotton goods, has been during the past several years interfered with to a great extent by the "Boxer Troubles" in China, and later by Russia's dominating policy in Manchuria. But with the beginning of the Japan-Russia war, and the opening of the ports in Manchuria, an export trade has developed during the past six or eight months, sufficient to take care of the production of all our export mills, and it is, I believe, safe to feel that with the settling of this war, we shall have a continuation of this demand, especially from Manchuria, and that this demand will grow yearly into increased millions of dollars; but in order to preserve this trade indefinitely, our Government should inaugurate a college for the education of our consuls and commercial agents, who, instead of being selected because of their political services, should be appointed on account of their business qualifications and commercial ability.

Just at the present time the spindles of the world consuming American cotton have a brighter outlook than they have had for the past several years. The shelves of the merchants have been denuded of their usual supplies of cotton goods, and instead of buying to patch in their stock, purchasers will have to replenish their supplies in full, and this will give to the American spinner and weaver a satisfactory domestic business, at prices which will not be subjected to violent differences, and for this state of affairs we owe a debt of lasting gratitude to the cotton planter who has recently exhibited his ability to husband his surplus product, and market it to meet the requirements of the cotton manufacturing world; and should he persistently pursue such a course from year to year, he will not only be able to secure a fair price for his product, but will materially assist in placing the cotton manufacturing business upon a sounder basis.

The deplorable labor strike among the cotton mills of Fall River having been adjusted, we find that labor conditions throughout our country are enjoying such a degree of prosperity that we may count ourselves fortunate indeed to possess.

The firm stand taken by the President in reorganizing the Panama Canal Commission, bears the strongest evidence of his determination to push this wonderful engineering feat during his administration with all the energy which he possesses, and should we succeed in connection with this gigantic development in having the members of Congress realize the necessity for the enactment of a well considered merchant marine bill, which will enable us to build ships to sail under the American flag, and if our elected representatives will also authorize the building of an adequate navy to protect our shipping and trading interests, this American country will soon take its position among the greatest export nations of the world, instead of occupying, as it does today, the seventh or eighth position, from a point of exports of cotton manufacturers, while we are admitted by all other people to be the greatest commercial country of all ages.

The next speaker was Dr. Brown, President of the University of Tennessee. Following Dr. Brown these papers were read:

"The Critical Analysis of the Detaching and Piecing Processes in Combing Machines," by J. W. Nasmith. This was closely identical with the paper read at the meeting of the New England Cotton Manufacturers' Association, and published in another part of this issue.

The Steam Turbine.

BY L. C. BULLINGTON.

A consideration of the steam turbine and its use for power purposes in cotton mills is a subject not entirely new to many members of this association. In fact, many of you have no doubt formed opinions and have actually installed or purchased prime movers of this type. The precedent has certainly been established by the adoption of turbines in the following cotton mills or kindred interests aggregating 120,000 horse power capacity:

Pelzer Manufacturing Company, Henrietta Mills, Oneita Knitting Mills, Atlantic Mills, Gray Manufacturing Company, Saco & Pettee, Victor Mills, Lane Mills, Fulton Bag & Cotton Mills.

In bringing the turbine to the attention of the association my endeavor is not to enter into a discussion of comparative merits or demerits of each of the types now being placed on the market by various manufacturers in this country and Europe; it is simply to make you better acquainted with a prime mover which is worthy of your serious consideration and certainly to be reckoned with in the equipment of a mill power house, old or new.

With the consideration of turbines we find the question of electric drive closely allied, for as yet in this country steam turbines of any considerable size have only been used for driving dynamos, principally of the alternating current type. It would seem, therefore, that the turbine carries with it the question of electric drive, and vice versa.

To many engineers the motor drive in cotton mill work is still on debatable ground, and I do not wish to be understood as advocating it under any and all conditions of mill work. Instead, each individual case should be carefully studied by engineers competent in this class of work, for determinations of this kind can only be made with a full knowledge of the conditions and requirements of each mill. And before any rigid conclusions may be made the steam turbine may be reckoned with. In many cases where arguments for and against electric drive are about evenly balanced, the steam turbine with its many good points and its many sources of economy will easily tip the scales toward the motor driven mill.

We now reach a point where we may profitably consider the requirements to be fulfilled by a prime mover in an electrically driven mill. We may then better determine how well the steam turbine meets the imposed conditions. The most important points are: Economy, permanence, reliability, simplicity, speed regulation, accessibility.

Economy—Ways and means for saving fuel and reducing the cost of power in a cotton mill have been given much thought by mill men with the result that the selection of a fairly economical engine of the compound type has been quite the usual procedure. We may therefore take the steam consumption of average sized engines in this class of service as a record for the turbine to approach and surpass. I am informed on good authority that 15 pounds of steam per 1 H. P. is a fair commercial figure with a good engine on average cotton mill load, 150 pounds steam pressure and 26 inches vacuum. I believe it to be a conservative statement that better results than this are possible with steam turbines.

Permanence—The question is often asked—Is the economy of steam turbines maintained during long periods of service? In answering this with reference to Westinghouse-Parsons type let us bear in mind that we have no complicated valve gear to wear out and lose adjustment, no piston and valve leakage, no internal rubbing surfaces to set up excessive friction, and small opportunity to get out of alignment. Adjustments and tests are made at the shop before shipment on each machine for all

conditions of load under which it will operate in the field.

Taking a broad view of this subject it is reasonable to conclude that there is no good reason why a turbine of the Parsons type should depart from its original economy. The many plants in service here and abroad, where careful records are kept of daily operation, provide practical evidence, and to these I refer you.

Reliability—No prime mover, however efficient, would be suitable for cotton mill service day in and day out, unless it could be depended upon. Shutdowns for long periods entail serious losses to both manufacturer and employe, and the plant must be kept running at all costs. I invite your attention to the simple and rugged construction of the turbine as inherently contributing to the desired end. With small chance of changing adjustments or over-worked parts the chances of a failure and shutdown are exceedingly remote.

Simplicity—It is scarcely necessary to emphasize a point which is so clearly obvious from the drawings and photographs shown. A machine consisting of only two main parts—stator and rotor—cannot be very complex. The real effect of the turbine's simple construction appears in the operation of the finished power plant. Any turbine operator will tell you how easy it is to run turbines; they frequently complain of the tediousness of their "do-nothing job."

From this it must not be inferred that a turbine operator may be without good mechanical knowledge, for when the machinery requires it, such knowledge must be of intelligent character.

Speed Regulation—The importance of good speed regulation must be obvious to you all. As before stated, the governor under normal condition gives a speed variation from friction to full load, not exceeding 2 per cent. of the average. This variation may be greater should the character of the load render it desirable, as for instance, in the operation of alternating current generators in parallel. In this case the governor may be so adjusted that there will be no tendency for the load to surge between one turbine and another, which must be connected electrically in parallel. We must bear in mind that in the turbine there is but one direction of motion with no forces to cause departure from an even turning movement. This is not true of the piston engine, in which the angularity of the connecting rod and the inertia of reciprocating parts cause regular speed variations during each revolution of the engine. Turbine driven alternators will, however, parallel nicely with those driven by piston engines and the turbine may be made to take the bulk of sudden load fluctuations, leaving a comparatively uniform load for the engine. The combination effect results in a general betterment of service.

The steam turbine, therefore, may be commended to you from all its phases, not simply from that of steam consumption, but also from that of practical operation. Complete familiarity with it as a prime mover will alone give full appreciation of its merits.

At the afternoon session on May 10 these papers were presented:

Closer Trade Relations Between the Producer and the Spinner.

BY HARVIE JORDAN.

Prior to 1900 the doctrine of prejudice and antagonism had been preached to our farmers by their leaders, and the bankers were presented in the attitude of an enemy rather than, what they truly are, our best friends. The nearer the farmer can be brought into direct business relations with the banker and both enjoy mutual confidence and respect, the former learning the high importance of becoming a depositor instead of a borrower, the more quickly will our country become emancipated from its present deplorable and ruinous credit system. The same rule that applies to the farmer and bankers is even of greater importance to the relationship which the cotton producers of the South should bear to the manufacturers of our great staple crop. As in the case of our bankers, cotton growers have been led to believe that the spinners of their staple were their greatest enemies. Without thorough investigation this charge would appear to be capable of that construction, but I am now firmly convinced that the time is not far distant when the cotton producers of the South will realize that the spinners of their product are their best friends and the only source to which they can look for securing a fair and equitable profit upon the sale of their raw material.

When we look at the true cause for the apparent antagonism of spinners to buy actively upon an advancing market when supplies are plentiful, we find that it is not due to any desire on the part of the spinner to depress the producer, but on account of the competition existing among themselves, and to the further fact that the spot cotton market of our country is largely controlled and dominated by speculative interests.

No manufacturer would think of buying a thousand bales of cotton for future delivery without hedging in the future market. Not to do so would make of the purchaser a speculator who would jeopardize the investment of every stockholder in his mill. And such a transaction is regarded as legitimate by the laws of our country because of the absolute need of such protection under the present iniquitous system by which the cotton markets of our country are controlled and dominated. The cotton exchanges of the country really safeguard purchases of the spinners or sales of the exporters in their legitimate transactions, but the bucket-shop operators, who encourage their customers to deal only in fictitious future contracts, are a serious menace to the legitimate business of the country and should be outlawed and suppressed by State or Federal legislation.

I am convinced that Southern spinners and cotton manufacturers are as deeply interested in devising permanent ways and means for fixing and holding the price of American cotton at a stable figure as are the producers. I am convinced that Southern manufacturers would gladly welcome a system that would absolutely hold the price of American cotton each year between nine and eleven cents per pound, basis middling, delivered under their roofs. Under the existing conditions of the cotton trade of the world, these figures are

not too high, but would give to both the producers and the manufacturers a fair and equitable profit on production and manufacture. That a stable price, fair and just to both the producer and the manufacturer can be fixed and maintained, there can be no doubt.

In order to maintain the price of cotton at a stable figure and avoid the evil and disastrous influences of speculation, plans must be arranged by which the sale of the raw product can be regulated in the markets of the country to meet the legitimate demands of consumption. The system which has so long prevailed, of throwing an enormous oversupply of raw cotton on the market during a short period of time and permitting a speculative demand to control the price should be disposed of as rapidly as possible. The cotton crop of the South cannot be properly handled without the construction of a first-class system of standard-built warehouses. Not only is the warehouse needed as a medium for marketing the crop properly, but it is needed to protect the staple from the devastating influences of climatic changes, rot and damage that affect the staple when held in the South as it is today. Cotton will keep in a splendid state of preservation indefinitely when properly housed, but damages rapidly when exposed to the weather.

The future problem of cotton production depends upon broadening the markets for our cotton and cotton goods, rather than curtailing production to meet the present demand for consumption. It is advisable to restrict the cotton acreage this year in the face of a heavy surplus produced in 1904 beyond the needs of consumption for 1905, but it is hoped that this is the last time that our people will be called upon to curtail the production of a crop so marvelously valuable to the South and to the entire world. We hope in a few years to see the Panama Canal opened to the commerce of the high seas and the shipping from Southern ports rapidly multiplying and laden with our products passing out and entering into the ports of the far East. We should rapidly push our trade with the densely populated countries of China and Japan. We should weave our raw cotton into the finished fabric and ship the manufactured product abroad. We should honeycomb the South with cotton mills and in the multiplied value of the raw material after it passes through the loom would soon make of the South the richest and most desirable country on the face of the globe.

Consumers of Export Goods and Their Requirements.

BY WM. WHITTAM, Jr.

Upon the subject of exporting cotton yarns and fabrics and the attention we shall give it will depend our future national standing as cotton manufacturers.

This trade in which we are all vitally interested is so vast in its ramifications that any attempt to cover it in anything approaching an exhaustive way would tax your patience beyond endurance.

I sometimes feel that but few of us have any clear conception of either its magnitude or importance. In order to bring out the salient features of exterior markets, I will first present for your consideration the latest available figures.

According to these, the manufacturing countries of the world export annually cotton cloth to the amount of approximately $400,000,000, yarns valued at $101,000,000, and miscellaneous products such as wearing apparel and other kinds of finished goods worth $152,000,000, making the total reach the stupendous sum of $653,000,000, and the demand is always growing, probably more rapidly now than at any time in the past. It is far from my intention to burden you with a multiplicity of figures, yet I cannot make my point altogether without their use. During the twelve months covered by the statistics I have just given you, Great Britain sold manufactured cottons in foreign markets valued at no less a sum than $358,232,000. Germany coming next with $79,524,000, and the United States sixth on the list, our sales abroad being but the comparatively insignificant sum of $22,404,000. We were also beaten by France, India and Switzerland, while even Japan, but a few years removed from absolute ignorance of factory manipulation, was but a paltry $2,000,000 behind us.

The vastness of the field before us may be impressed upon you by being looked at from another angle. Of the aggregate exports of the cotton manufacturing world, Great Britain sold nearly 55 per cent., Germany 12 per cent., and the United States less than 3 1/2 per cent. The teeming millions of the Orient are the best customers of the industrial Occident, for Asia takes $277,000,000 worth of cottons annually. But in this Western hemisphere of ours we have an important market very much nearer home, which ought to be as American commercially, so far as the cotton trade at least is concerned, as it is geographically. A territory from which we take the bulk of its exports and which needs but the vivifying touch of our oft vaunted business enterprise to make its people turn to us for their purchases as they already do to sell their surplus products. On this continent our Southern neighbors buy nearly eighty millions of cotton fabrics a year, of which we sold them last year less than nine and a quarter millions.

The figures I have given you prove two things very clearly. First, that the world's exports are gigantic; and second, that our share of them is most minute.

There are a good many reasons for the insignificance of the American position, and nearly all of them discreditable to the business acumen of the managers of our industry. I shall consider only the most important one with anything approaching detail.

Today we are very much in the position of a dealer who would offer to sell a customer a buggy when he wanted to purchase a farm wagon. We are not offering the goods the purchaser wants and insists upon having.

You will naturally ask: "Can we make such goods in our mills without expensive changes in equipment and organization?" You gentlemen can answer that question for yourselves from the following particulars. "Export shirtings," as they are commonly termed, are from 30 to 50 inches wide, and their construction runs from 48 by 48 to 76 by 72, always 37 1/2 yards in length, usually 30s warp and 36s filling, and carrying from 50 to 125 per cent. of size in the warp. The amount of size

is determined by the weight of the piece. A piece 39 inches wide, 64 by 60, must weigh 8 1/4 pounds. A similar cloth 45 inches wide weighs 9 pounds, and if 50 inches wide the weight would be 10 pounds. These are just as staple as our standard print cloths. I may add that the standard 8 1/4 pound "India Shirting" I have just given you particulars of, is in our textile parlance 4.53 yards to the pound and that from 25 to 33 per cent. of the entire weight of the cloth is size.

Incidentally, it may interest you to know that the ingredients and proportions for a mixing to put 100 per cent. of size in the warp. They consist of 48 per cent. by weight of China clay, 35 per cent. wheat flour, 9 1/2 per cent. tallow, wax 1 1/4 per cent., magnesium chloride 3 3/4 per cent., zinc chloride 2 1/2 per cent., and about 3 ounces of Aniline Blue. Other grey fabrics which are sold abroad in immense quantities are T cloths, long cloths, madapollams, domestics and Mexicans. Without wearying you with the details of their construction, I may say that almost every non-manufacturing country uses them in considerable quantities. In this respect they differ materially from the goods we now call "exports," which are almost unknown, and but little wanted, except in China.

These fabrics which are in greatest demand in foreign markets, are manufactured almost exclusively by Lancashire mills. I mention the locality of their origin by way of introducing a statement which will doubtless surprise some of you.

The cheapness of the labor cost of the English cotton mills has been so often quoted that it is taken pretty much for granted that excessively high wages constitute our most serious bar to effective competition. As a matter of fact you all know that the price of weaving on common looms amounts to about one-half the total charges for labor in the production of cloth, but I am afraid that you do not know that the established piece work prices for weaving in Lancashire are from ten to twenty per cent. higher than those generally paid by American mills.

"The Meaning of the Various Coal Analyses," by George M. Carpenter, Nashville, Tenn.

"Detailed Experiments as to the Power Required to Drive Cotton Machinery Electrically," by Louis I. Guion, Columbia, S. C.

Winding Machinery.

BY FRED WILDE, Manager A. T. Atherton Machine Co., Pawtucket, R. I.

In calling to your attention some of the features of the latest product in winding machinery, the camless winder, it is not necessary to go back over the field of the development of winding in general, as this is a matter of history, and already familiar to all parties who have interested themselves in it. Sufficient be it to say that it has been the aim of the inventor to eliminate all features in the machine itself, which would cause trouble and annoyance to those using it, and to produce a package which would more adequately meet the demands of the consumer of the product. To obtain these results the following points have been carefully considered: simplicity, power, floor space, wearing qualities, ease of operation, saving of waste, proper lubrication and material to insure long life, together with uniformity of product.

A new mechanical motion is devised to supplant the regular grooved cam with its dogs, rolls and accompanying parts, so as to facilitate higher speed, and consequently an increased production without the jar, vibration and wear occasioned by the unavoidable shock at the reverse point of a cam; this motion to all intents and purposes is a regular crank motion, the two dead centre points common to motions of this class, being practically eliminated by a simple arrangement for accelerating the speed of the wrist pin as it passes the two extremes; and the fact that these actuating parts move in continuous revolution, insures a more steady and even motion than is possible where a cam is employed.

The crank motion referred to is placed next to the driving pulleys at one end of the machine, and connected by levers to two rock shafts running longitudinally with the frame. To these shafts opposite each spindle are attached the vibrating arm for actuating the thread guide, each arm being connected to its respective guide by a light, durable lever, and the ease with which these parts can be adjusted or assembled is an admirable feature.

The driving spindles extend at right angles from both sides of the frame, an endless belt being employed to drive each of the oppositely arranged spindles, there being a suitable belt tightening arrangement to facilitate the taking up of the belt. Any change of ratio desired is readily obtained by means of change gears at the end of the frame, and the simplicity and accuracy of the device, together with the few parts necessary, cannot fail to establish it as a superior construction to what is commonly in vogue.

The cone arbor is especially worthy of mention, inasmuch as it is entirely automatic, the paper core being fastened securely in position without any effort on the part of the operator other than simply placing the same upon the arbor; likewise, the act of removing the package automatically releases it. The spindle supporting the cone arbor runs in ball bearings, which, not being in close proximity to the yarn mass, remove the possibilities of soiled yarn. A suitable friction arrangement is employed governing the amount of pressure between the cone arbor and the drive roll, adjustable to a fine degree, and differential in its action.

The stop motion for raising the package from its drive roll is by far the most simple and effective yet produced, there being practically no connecting racks, arms or links between the cone spindle and stop actuating device when the spindle is in operative position, thus obviating the slipping and abrasion sometimes experienced at the starting of a new package.

The slub catcher employed on the camless is most simple and effective, and not easily changed by the tampering operative. It consists of a sheet steel disk in which are cut a series of radial slots of various widths to meet the requirements of the product being wound, the disk swinging on a centre pivot in order to bring the slot desired to proper alignment. This catcher is receiving special commendation among the mills using the camless machine.

The tension device consists of a series of interlocking fingers, readily adjustable. The cleaning propensities of this style of tension is very apparent, and it is further desirable, as it compensates for the varying delivery of the supply.

Another very important feature for your consideration is the simple device for maintaining the axis of the cone spindle in a plane parallel to the axis of the drive roll during the continuous winding of the package—the practicability of this arrangement being very apparent, as it permits a closer adjustment of the thread guide to the yarn mass, insures a more uniform pressure and prevents looping and abrasion of the yarn.

As you have undoubtedly noticed from the above references to the drive roll, the packages are rotated by frictional contact, and I beg to state at this time, that we have not departed from the old English system of driving a conical package with a conical driver roll, and a straight parallel package with a parallel drive roll, and to our best knowledge no serious trouble ever resulted from an abrasion of soft hosiery yarn wound by this system; in fact a large percentage of our best yarn mills have wound by this method for many years. We cannot claim the friction drive absolutely perfect, but as you are all aware, there is more or less frictional resistance offered to yarn in the various processes of manufacture, and in all departments and classes of winding, the main object of the builders being to minimize this resistance as much as possible, and then smooth and polish the contacting parts, to prevent possibilities of abrasion. A frictional drive package has two distinct advantages, the open wind, and uniform tension; both assist in establishing a uniformity of product which is greatly appreciated by both manufacturer and consumer, as it saves rewinding and losses from seconds.

The product of the camless winder known as the peerless package is, we believe, worthy of your earnest consideration, and its development is along a line which will doubtless appeal to you as being practical, inasmuch as the formation of the package is bound to establish a more satisfactory and closer relation between the manufacturer and the consumer.

A great many knitters buy their yarn on the cop or cone, and then rewind on to what is known as a bottle bobbin, as by so doing they derive the benefits apparent from the increased taper of the bobbin and the filling wind with which same is wound.

In designing the peerless cone package, the fundamental principles of development consist in embodying the essential features of the bottle bobbin in a yarn mass, which would be self-sustaining and suitable for transportation purposes. To accomplish this result it was considered necessary to increase the taper of the package to a degree that would insure a free and uniform delivery of the yarn as it is drawn from the base around the apex end to the guide eye of the knitting machine, and the delivery is still further facilitated by laying each layer of yarn slightly in advance of the preceding layer, thus forming the convex base peculiar to the peerless package. The increased taper merits your careful consideration, gentlemen, as it is positively a means for preventing the yarn catching under knots or protuberances on the sides of the package, and prevents the lint collection on apex end, common with a cone of insufficient taper. The convex base prevents soiled yarn at that end by establishing a proper clearance, and also supports and holds each layer of yarn, thereby preventing looping and cobwebs.

"Spinners Should be Ginners," by H. C. Burnett, Humboldt, Tenn.

At the session on May 11 the following papers were read:

Dust.

BY JOHN W. FRIES, Winston-Salem, N. C.

My subject is dust, simply common, every day dust, the despair of the careful housewife, but which we men generally accept as a necessary evil, and scarcely ever give it a thought because it is so common.

I will not take up your time to discuss dust as dirt, in which aspect it is simply a nuisance; but with apology to the medical profession if there should happen to be a member of it here, I will talk about dust in relation to health.

The injury to health from dust comes from what we take into the body through nose or mouth, from what we breathe, or eat, or drink and the dust particles which we inhale may be classified as inorganic, organic and bacterial.

As a rule, dust of organic origin is not of itself particularly harmful, because it is not hard, without sharp corners and edges, and hence not likely to cause a lesion of the membranes. As to cotton dust, with which we manufacturers are particularly interested, it is safe to say that in itself at most it only tends to dry off the mucous membranes, and never causes specific diseases like "stone cutters' asthma" or "coal lung" (anthracosis) to which miners are subject. Probably the only mechanical injury done by the dust of cotton mills is due to the fine silicious particles carried by the fibre, and by particles of emery and steel thrown off in the process of card grinding. Hence, one would expect to find a considerable proportion of inorganic matter in the dust of picker and card rooms, though it is surprising how much there is also in the dust of spinning rooms, where one would expect to find almost entirely organic dust from the pure cotton fibre.

In a few large city buildings there have been installed extensive ventilation, filtration and washing apparatus for the treatment of the air in those particular buildings, but such installations are costly and are applicable only in new buildings which are planned for such construction and when the rents will justify such large outlay.

I am introducing apparatus for moistening and washing the air indoors, which can be used anywhere with belt power, or electric motors, and a small stream of water, and I have named the apparatus Cleanairs. The factory type can be driven direct from the ordinary mill shafting, requires only two or three gallons of water per hour, and will handle at least 50,000 cubic feet of air per hour. Then if one Cleanair be installed for every 25,000 cubic feet of space as I advise, the air in that room will be washed twice per hour, if hot and dry it will be cooled and moistened, and a surprising quantity of dust removed.

It seems like a paradox to say that apparatus which will moisten dry air will also remove excessive humidity, but in explanation of this seeming paradox I can only refer to familiar natural phenomena. We all know that if a day be hot and dry a shower will cool and moisten it; on the other hand, when the humidity is near the dew point, a shower will precipitate that humidity. So I venture the assertion that Cleanairs will not only cool, moisten and clean the air of ordinary work rooms, but also that they precipitate the fog of steam which is so troublesome in the dyehouse.

A simple fan gives the air and water a rotary motion within a sheet metal case, and centrifugal force spreads the water in a thin sheet or film over the inner surface of this case with the air in intimate contact. The same centrifugal force at the same time throws the dust particles, or the water globules in the super-saturated air of the dye-house, outwards into the film of water, and the discharge spout of the machine carries off the water with the collected impurities. If the machines be placed along one side of the room they take the air on the line of the wall and discharge it across the room thus securing efficient circulation.

As a chemical question it will be perfectly easy to remove this carbon dioxide by adding caustic soda, or something of that kind, to the water used in Cleanairs, but as an economic question I am not yet prepared to say to what extent it would be feasible. But it should be entirely so for hospital wards, department stores, or crowded halls and work rooms in cities.

If experience proves that this idea is feasible, then people can safely breathe the same air over and over again indoors, and, in fact, what is indoors will then be more salutary than can be had in the crowded streets and narrow alleys of any city, or in the dust and smoke laden air of any industrial center.

"Waste," by William G. Nichols, Chester, S. C.

The Southern Mills' Opportunity.

BY J. H. M. BEATY, Director Clemson Textile School, Clemson College, S. C.

The purpose of the textile school is to teach the art of manufacture and to give practice in applying methods and principles involved in this art. To be more specific, a textile school is primarily for the purpose of directing those, who wish to make the milling industry their business, in their study of textile fibres, to teach them their manipulation and the after-processes of manufacture demanded by the trade. Such a training, properly supplemented by practical work in the mill, will result in the improvement and development of the industry—the manufacturer and individual alike receiving the benefits.

The man in active control of a mill should know: (1) what to do; (2) how it should be done; and (3) have the ability to do it and do it properly. One cannot gain this knowledge in a few months' schooling or in a few months of practice in a mill, or in a few months of a combination of the two, but acquires it only after years of study, observation and application.

It is generally conceded, however, that the best place to learn any business is where that business is actually being carried on. Therefore, it follows that the best atmosphere in which to learn cotton manufacture would be in a mill. But after careful consideration, the speaker finds several reasons why one does not acquire this knowledge there as rapidly as one might desire: (1) a position in the mill usually requires all of the operative's time and attention; (2) he often does not know how to observe carefully and draw useful lessons from what he sees; (3) he probably does not know what to study and consequently would not differentiate between the important and the unimportant; (4) there is probably no one in the mill who has any special interest in him, to direct his line of thought; (5) after a long day's work the average mind is unfit for study at night; (6) the average mill is equipped for one class of goods only.

The advantages the textile school would offer to such an one, would be (1) his whole time and attention, if he so elects, may be devoted to the study of textiles; (2) he is taught to observe and is looked after by competent instructors whose business it is to direct his line of work; (3) to become acquainted with results to be expected from certain known conditions, he performs experiments; (4) special stress is laid on those points which cannot be readily had in a mill; (5) the equipment is for a wide range of products made from several varieties of cotton.

There is no doubt but that the practical operation of the machinery is learned more thoroughly in a mill than can be taught in a school, but the practical operation of the machinery is the smallest part of the business. A green hand can be taught to operate a machine, with a fair degree of skill in a few weeks, the art of manufacture is not mastered in a lifetime.

Preparatory to undertaking the study of cotton manufacture, the speaker served an apprenticeship to the machinist's trade in a first-class railroad repair shop. Young men were employed there who, after two or more years of service, could not solve such a simple problem as computing the circumference of a circle, its diameter being given. No doubt, at the expiration of their apprenticeship, they hoped to be classed as journeymen and to receive compensation as such. [illegible] such a limited mental training, what would those men be worth to send out on a job where brains and judgment was three-fourths the battle? What a difference a little systematic training might have made in the lives of those young men and on the character and amount of work passed through their hands!

To bring the matter nearer home, suppose we glance at some of the young men who, to all appearances, are making an honest effort to master the processes of cotton manufacture. In talking with some of these young men to find out how they are progressing and how far they have advanced in their undertaking, the reply is often received: "I have not been shown that;" or "No one has told me how to do something or other." Are we to judge from such replies that some of our future manufacturers are expecting to learn the business by being told or shown everything about it? Do these bright young fellows, and some of them are bright, expect to comprehend manufacturing by simply staying round a mill for a time, and not

study out the majority of mill problems for themselves? It is the mastery of such by one's self that makes the competent man. The young man who enters the mill with no previous textile training will be slow in reasoning out these problems and will have to be shown and told many things. The young man who enters the mill after a good textile training, while he, too, will have to be shown and told many points, yet will be competent to reason out many for himself, will be able to comprehend the scope of the work quicker, and will make far the superior man of the two.

"What a Northern Man Has Learned from Thirty Years' Residence in the South," by B. W. Hunt, Eatonton, Ga.

Plans for Furthering Export Cotton Goods Trade.

BY C. A. GREEN.

It has always appeared to me that if more push and energy had been put into the development of foreign trade as a whole, and systematic work put on the sale of cotton goods in wider fields, better results would be obtained, and that a war in one country, or a flood or famine in another, while to be deplored, would not unsettle the market to any great extent, as fortunately, disasters do not fall on all markets at the same time, and while trade is bad in one country, attention could be turned to another.

China's international trade will continue to grow, but it will require aggressive action on the part of our manufacturers to secure a proper share of it.

The American merchants are few in the East. The British merchant in China looks after his own interests, but does not seek to develop trade unless he sees a personal gain in so doing, and therefore does not adequately represent the American manufacturer. They should watch the trade very carefully for themselves. To get the best results the manufacturer must push his own goods and create a demand for them. Very seldom will the Chinese people discriminate between American and other foreign goods. They make their distinction between Chinese and foreign. Our goods will not be accepted simply because they are made in the United States, although their merit is to some extent recognized. This is also recognized by some of the English manufacturers as well. I have seen goods marked in big letters, American Mills, and then in small letters way down in one corner, "Made in England."

I have said there were few American firms in China, and referred to the Japanese influence. Take this into account when considering how to gain a larger share of the trade of the vast number of buyers in that country. Out of 1,279 foreign commercial firms in China, England has 420 and Japan 361. These two have three-fifths of all the foreign firms and one-half the foreign residents. How are we to counteract the influence of these? It is fair competition and a part of the situation. To illustrate, I have had English firms say in answer to my question whether they sold American goods, "yes, we sell them because we have to, but of course we prefer to buy our goods from 'home.'" It may be said the trade is going all right; so it is just now.

One of the best informed American consuls in China sums up the situation in that country in this way. The whole trade situation in China is promising, and so far as the United States is concerned is without special features other than the need of American manufacturers studying the Chinese markets and the markets in the far East generally.

American commercial men do not seem to fully realize that in order to gain trade in China it is necessary to study the needs of the country, especially in the line of cheap goods, and supply the goods wanted, rather than to send merely a surplus of what has been manufactured for the home trade, or for some other foreign market. The needs of China are special; he must cater to the wants of the people—what Lincoln called the plain people. That is where the bulk trade is. Find out what they want and offer it to them through proper channels. Send out and investigate yourselves; that is the best of all methods. Many a native house is handling American goods in quantity, that never heard of you as the manufacturer. England and Germany are working hard for the trade of China, as in Japan, on certain lines.

If I may be allowed, I would say that in my judgment, based on personal observation, the very best way for you to increase your foreign trade and make it steady all the year round, would be to get out into the field, have men selected to represent several mills. If thought best, come in contact with the buyers, learn their requirements, make special chops or trademarks for them, show them you want their trade. In other words, follow the lead of other industries that have been successful. The English manufacturers are now discussing a similar plan of campaign for several markets. In all my travels in the Orient, Africa, Australia, etc., I have never met a man introducing American cotton goods. While he may have been about, I never saw him. You find the agricultural implement man, the machinery man, the boot and shoe man, the iron and steel man, the flour man, the oil man (he is everywhere), but never the cotton goods man.

Some may say all this involves credits; well, then what? The manufacturers of no country are in better position to protect themselves from mistakes along this line than our own. Many of you may not be aware of this fact, that the mercantile agency of R. G. Dunn & Co. have 48 branch offices outside the United States, and can furnish you with credit information on trades in any part of the civilized world. Aside from that it does not follow that you must take orders direct. Let the buyer place his order any way he pleases, so long as you get the trade; but the maker must find the taker.

Mechanical Stokers.

BY B. C. FENNELL.

In opening the subject of mechanical stokers it is not my privilege nor intention to cover all the various devices in use for this class of work. I am to present to you the advantages of the Jones under-feed mechanical stoker.

(1). Although opinions naturally differ as to methods of application, the best authorities on steam practice are very nearly unanimous in conceding the superiority of mechanical over hand stoking. This wise conclusion is based on intimate knowledge of present day conditions in the industrial field, where power must be generated and be available at high and constant pressures. Hand firing is unable to meet this requirement, so the use of mechanical stokers becomes necessary.

Automatic stokers are a success; but in considering their application, the conditions as they exist in the plant to be equipped, must receive serious consideration, as must also the character of the work to be done. One type may be limited in its field of usefulness more than another; and, during the reading of this paper, I shall try to show you that the Jones under-feed stoker is the least restricted of all.

(2). For the purpose of distinction it is well to state at this point, that all mechanical stokers may be classed as operating upon either the "overfeed" or "underfeed" principle. In the former types the fires are fed always from above, as in hand-firing. The name "under-feed" gives you at once the principle of its operation.

(3). It was and is, a well known fact that when fuel is introduced into furnaces in the ordinary manner, the power results from this hand firing are due to the necessary use of an excess amount of air and the placing of the fresh fuel on top of the incandescent fuel, this deadening the fire and at that time throwing off immense quantities of gas which would be combustible if properly mixed with air, but under these hand-fire conditions cannot be so mixed. The continual opening of furnace doors also makes a loss.

Realizing that theoretically, at least, the proper way to feed fuel to the furnace was from underneath the bed of fire, so that the hottest part of the fire could be next to the heating surface at all times, and so that the gases liberated from the green fuel must necessarily pass through the burning fuel, various attempts were made as early as 1800, or thereabout, to devise mechanical means for producing the desired results. That none of the attempts were successful, is evidenced by the fact that until the invention of the Jones underfeed mechanical stoker by Evans Williams Jones, of Portland, Oregon, the under-feed mechanical stoker was unknown to the commercial world.

This stoker was first placed in use about 1890, and the stokers first invented and installed by Mr. Jones are still in operation. That the desired results first herein mentioned are obtained, is due to the following facts:

First.—The introduction of a sufficient amount of fuel beneath the fire so thoroughly break upon the burning fuel in the furnace. thus insuring a proper mixture of the air and the volatile gases, which is necessary to obtain perfect combustion.

Second.—The ability to feed the fuel to every part of the furnace in any quantity and at any time desired.

Third.—The introduction of fuel into the furnace without lowering the temperature of same.

Fourth.—The utilization of all heat units in the fuel introduced, the bottom of the furnace proper being sealed.

Fifth.—The thorough coking of the fuel before the same reaches the zone of fire.

Sixth.—The introduction of air for combustion below the body of burning fuel, and above the body of green fuel.

Seventh.—The heating of the air for combustion before introducing same to the furnace proper.

Eighth.—Cleaner heating surface, due to more perfect combustion.

Ninth.—Ability to take care of varying loads because of the fact we are not dependent upon natural draft for the air combustion.

Tenth.—The automatic regulation and proportioning of the fuel and air supply by the steam pressure carrier, thus making it theoretically (at least) impossible to burn more fuel than is required to maintain the desired pressure.

The practicability of the Jones stoker is evidenced by the following facts:

First.—There are no moving parts in contact with or exposed to the heat of the fire.

Second.—The entire absence of all revolving parts, which are liable to be quickly cut away by the action of the coal dust.

Third.—The absolute protection of all parts exposed to the heat of the fire, due to the positive and constant circulation of air at all times.

With the Jones system the necessary air for combustion is furnished with an ordinary fan blower operated by an independent engine, thus placing in the hands of the operators means for instantaneously meeting any excessive demand for steam; and with this system a shorter stack may be used that would be impossible under hand-fired or natural draft conditions.

It has been repeatedly claimed by engineers, who have not taken sufficient time to look into the subject, that there is no saving by the use of stokers, outside of the recognized saving in labor, provided careful firemen are employed.

If a fireman could be secured, and he could handle his fires without opening his furnace doors; would throw on a small amount of coal at each firing, at frequent intervals, and in such a way that all of the volatile gases would be consumed; provided he were able to decrease the amount of air necessary for hand firing about one-third, with possibly the ability to heat the air without the use of an air heater, this would probably be true; but no fireman, however careful he may be, could fire a boiler in this way; and, as there is an acknowledged saving in not opening the fire doors, as well as in firing coal in small quantities and at frequent intervals, there should be no doubt as to the economy of stokers over hand-firing, and especially so in the case of the under-feed stoker, as this type insures perfect combustion of all the volatile gases, and when properly designed, will keep the fire broken up and free from holes and in good condition at all times.

There is a decided gain in introducing the air into the furnace at a high temperature, as by so doing, the air mixes more readily with the volatile gases as they are distilled and liberated.

While in the case of the Jones under-feed stoker, the same amount of heat is absorbed by raising the temperature of the air for combustion as in hand-firing practice, the process in heating the air is such that the air does not come into contact with any of the volatile gases until it enters the furnace through the opening in the tuyere blocks, and after being raised to a high temperature by the radiation of heat through the tuyere blocks and dead

plates, and as air at high temperature mixes more readily with the volatile gases than does air at a low temperature, there is not the loss due to lowering the temperature of the volatile gases as in the case of the "over-feed stoker" and in hand firing practice, where the air, passing through the grates at a low temperature, comes in contact direct with the gases at a high temperature, resulting in a loss due to an imperfect union of the air and gases, which, in turn, results in incomplete combustion.

In addition to the virtues just mentioned, the Jones under-feed stoker possesses the advantage of furnishing heat to a much cleaner boiler than does the hand-firing furnace. On account of the complete combustion obtained by its use, the heating surfaces of the boiler will be found to be much cleaner than in hand-fired practice. As combustion is practically perfect in the furnace proper, flames are seldom seen at a greater height than 18 inches above the top of the body of burning fuel; consequently there is a marked absence of soot on the heating surfaces, resulting in better efficiency, more capacity of lower uptake temperature, all of which are necessary to the economical operation of a boiler plant.

To illustrate that the Jones system is correct and that combustion is commercially complete, take a cigar and light same.

As soon as the cigar is well lighted, blow through the cigar. The end will glow brightly, and if the blowing is sufficiently hard, sparks will fly off, but there will be no smoke after the first puff, when a slight haze may arise, due to some unconsumed tobacco in the ashes. If you have the patience to continue this operation a sufficient time the cigar may be consumed in this manner, but it will burn slowly, although there will be a hot glow on the end all the time. This represents the economy of fuel with the under-feed principle, at the same time maintaining high efficiency as represented by the hot fire.

By reversing the cigar, placing the lighted end in the mouth, a dense steam of smoke may be made to pour from the top of the cigar (the chimney in this case), by blowing. The fuel is now above the fire, as in over-feed firing. At the same time the cigar will burn rapidly (showing quick consumption of fuel), but there will be no brighter fire and consequently less economic results.

This is a simple experiment, but illustrates the principles correctly of the Jones under-feed stoker. In the smokeless demonstration the blowing represents the forced draft by which the air is delivered through the green fuel, reaching the "furnace" just below the point of combustion. The second experiment can be made by drawing on the cigar in the ordinary way instead of blowing through it from the lighted end, when "induced" or natural draft, with fuel above the bed of fire will be correctly represented as well as its evil effects.

As the Knoxville meeting is in progress while this issue goes to press we are unable to give a full report of the proceedings, including the result of the election of officers. These details will appear in a later issue.

TEXTILE ADVERTISING THAT HAS SUCCEEDED.

[This is the third of a series of twelve articles, which will recount certain tangible success in the advertising of textiles along the lines advocated by the series of articles published last year. Last year Mr. Balmer discussed in a series of six articles, treating the necessity and possibilities of textile advertising, the planning of the advertising campaign, and general publicity and work upon dealers and follow these with a series of six other articles, each article being an investigation into the present state of the sales of six leading textile lines. This was theory, even though it was theory born of experience. The new series will treat of actual successes—no theory at all, but fact—something that has happened. They are living instances taken from every-day advertising life, and examples of the application of the theories that have formed the subject matter to the preceding articles.]

During the spring of 1899, an energetic young Pennsylvanian by the name of M. G. Collins interested a small number of York business men in forming a company for the purpose of manufacturing silk. A corporation was duly organized at York, Pennsylvania, under the name of the York Silk Company. During the summer of that same year, a small mill was erected at York and in November the first silk cloth was woven. It was Mr. Collins' belief that a great opportunity awaited the manufacturer of silk in this country and with straightforward methods and earnest determination, he undertook to confirm that belief.

M. G. COLLINS.

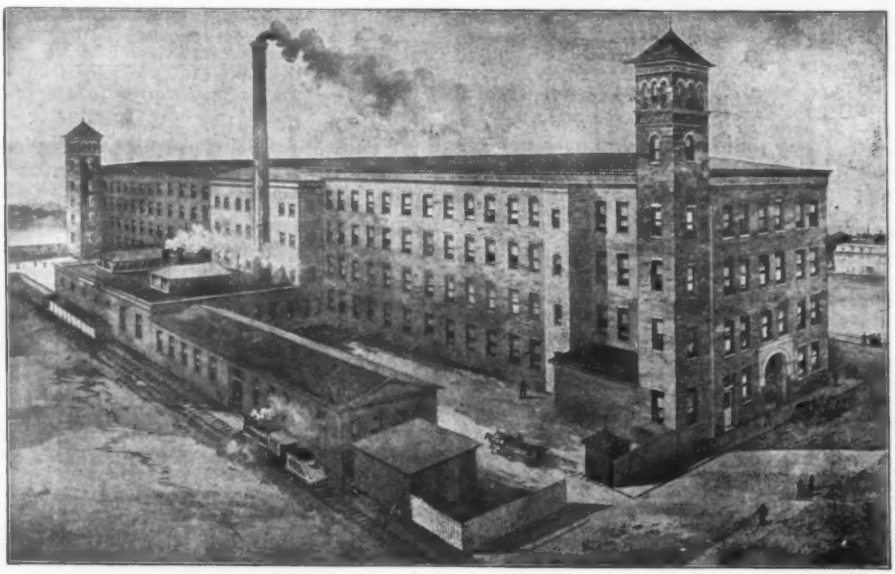
There were many difficulties to be overcome during the first year of the company's

existence. The capacity of the mill was discouragingly small, the help hired had to be taught to make the silk cloth properly, to work skilfully as well as quickly. After careful deliberation, it was decided to make black silk, and if possible to become specialists in the manufacture of that particular line. Staple black silks were made from the various weaves, as taffeta, peau de soie, and satins. They knew there was always a demand for black silks, while colored or fancy silks often depend upon the dictates of fashion. During the two months—November and December, 1899—the sales of the company amounted to $3,229.19, but the next twelve months—1900—saw them increased to $139,798.48. These sales were then confined to the jobbing and garment-making trade.

By this time the product of the company had been perfected so that their silks were of the quality that could be talked about. They were making good silks—they knew it—but they realized that they must let others know about the quality. The jobbers were buying a certain amount of their goods, but why shouldn't this amount be increased? There was but one thing lacking and Mr. Collins recognized that deficiency. The goods must be advertised to the consumer. So in the fall of 1901, an appropriation of $7,500 was laid aside for the next year's advertising.

It was seen at once that the equipment must be increased. Larger plans were laid. In August, 1902, the present York Silk Manufacturing Company was organized. With the new capital, additional machinery was added and several factories were taken in. The weaving mill of the Pennsylvania Silk Company, at Fleetwood, the spinning factories of the Diamond Silk Company, at York and Carlisle, were purchased.

By the fall of 1903 Mr. Collins became firmly convinced that more retail merchants of the country should be reached and that they could be, providing the right kind of merchandise was made and some distinctive way of identifying the same was secured, and then advertising this distinctive kind in order to create a demand to the retailer. After several experiments and failures, the idea was conceived of placing a special selvage on the edge of each piece of goods, and weaving their name on this selvage. To protect this idea, they did the wisest thing by patenting it in all the principal countries of the world. With this distinctive mark on their high grade manufacture, they decided to compete with the best foreign made silk on the market. But one thing more was necessary and that was a good name which they could use for the trade-mark. Many were the ideas and names considered that would be not too



ONE OF THE FACTORIES OF THE YORK SILK MFG. CO., AT YORK, PA.

long, not too bizarre and yet something that would attract the attention, as well as recommend their goods. The name which they at last hit upon seemed to fill all these requirements, and on January 1, 1904, the name Moneybak was unfurled to the trade.

Then began a forcible advertising campaign, in which such slogans were used as "Moneybak Black Silks—satisfaction or money back." Space was taken in all the leading women's publications that spring, and the housewives of the country were impressed with the quality of the goods. They hoped to secure one merchant in each town to sell Moneybak.

The name, the idea of the campaign and the supporting magazine publicity appealed to the merchants, and at the close of 1904 Moneybak silks were on sale in 525 cities and towns in the United States, with the sales of just this make exceeding $300,000, while the total sales of the company had increased to $1,264,541.31 for the year of 1904. On December 30, 1904, orders were accepted for goods to be delivered in January, February, March and April that aggregated 9,000 pieces, amounting to about 540,000 yards. This spring they have simply been deluged with orders. These orders practically cover their product for three months. Their entire mill force is completely overtaxed and they have been obliged to cease taking on new agencies. During January, February and March, the sales were $497,000. They are making plans to increase their mill capacity in order to supply this great demand.

Mr. Collins, now general manager of the company, says regarding the rapid growth of their business during the few years since their company was formed: "We are firm believers in the fact that the goods must be right to begin with. Our three fundamental rules, which we have followed as a company, are: first, to know how to make the goods right; second, to make the goods right; third, get out and tell the consumer and the merchant that these goods are made right. I do not believe in hiding your light under a bushel and I think the record of our business would show that we have followed this policy. Every one of these three qualifications is needed. You cannot build up a business without making the goods right in the first place and you cannot make them right unless you know how, and you cannot expect to sell the goods unless you let others know about them."

And this is the way that Mr. Collins let others know about the York goods. I have said that his advertising appropriation in 1902 was $7,500; in 1903 he doubled it, while in 1905 it will amount to over $40,000. In 1903 he used one column in The Butterick Trio, February, March and April; while during the same months this spring he increased the space to double columns and the returns he received more than satisfied him for the increase.

This magazine publicity has been well supported by follow-up matter to the local dealers. Dainty little booklets are used from their own printing plants, telling about the advertising campaign that they are conducting and suggesting ways of pushing the goods.

The details of the campaign have been well conducted by John G. Kleppinger, advertising manager. Twelve publications were used for four months in the year. Each person answering the advertisements was sent a typewritten letter, a booklet, some samples, and a price card. Then in a month two letters were sent those who could not be referred to any agency, and only one to those who lived near an agent. In this way there was a complete chain connecting consumer, dealer, jobber and manufacturer.

I have told the story of the York Silk Manufacturing Company as an example of what an American manufacturer can do in competition against foreign products. Foreign silks have heretofore been preferred, but the York Manufacturing Company, by manufacturing a silk which could be depended upon and which is just as attractive a product as the foreign, have by the aid of publicity built up a great and well deserved business. They have been a factor in raising the standard of American black silks, and at the World's Fair in St. Louis, they were awarded the prize for high grade, long wearing black silks. Early in their campaign they realized the advantage of telling the American women about the American product and their results show the wisdom of their plans.

THOMAS BALMER.

TEXTILE PROCESSES.

EDITED BY E. A. POSSELT.

OUR TEXTILE SCHOOL.

XII—SKIP TWILLS.

This subdivision of our regular twills embraces weaves in which the twill line does not run continuously over the face of the fabric; said twill being, well defined, grouped for two or more threads, as the texture of fabric, foundation twill used, and effect required may designate. They are a most important division of weaves, used extensively, either alone or in connection with other weaves, in the manufacture of fancy worsted, trouserings and suitings, fancy cotton, woolen or worsted dress goods, as well as figured silk fabrics of every description. On account of the characteristic, small, well broken up effects, these weaves in their general appearance in the finished fabric closely resemble granite weaves, in fact the smaller effects as obtained from the $\frac{2}{2}$ 4 harness, $\frac{2}{3}$ 6 harness, etc., twill may be used in connection with these granite weaves.

The rule for constructing these weaves is thus: After selecting the foundation (45°) twill, use one, two, three, four or more threads of this regular twill in its proper shape, after which arrange a complete break (risers opposite sinkers, in the two joining warp threads throughout the entire repeat of picks in the weave) and starting with this break thread draft again one, two, three or more warp threads of the foundation twill, after which arrange again complete break, and continue to draft warp threads and break until repeat of the new weave is obtained. Besides using only one foundation twill, as we will later on show, two 45° twills may be used, then alternately drafting once from the one twill once from the other. The foundation twills used, in this instance must be of equal repeat, for example we may thus combine two 6 harness, two 8 harness, two 10 harness, etc., regular twills. The repeat of the new weave in this instance will call for the sum of the number of harnesses required for both foundation twills for example combining two 8 harness regular twills in this manner will call for 16 harness for the new skip twill thus obtained, whereas if using only one foundation twill for the construction of the new skip twill, the number of harnesses required for the new weave and the foundation weave will be the same.

These skip twills can be divided into (1) such as obtained by skipping warp ways; (2) such as obtained by skipping filling ways; (3) such as obtained by skipping warp and filling ways.

SKIPPING WARP WAYS.

As will be readily understood, this subdivision of these skip twills, especially in the more pronounced effects, will produce stripes.

Before proceeding with the lesson, we will now explain a rule how to obtain the characteristic break previously referred to, provided if dealing with one foundation weave:

After selecting the foundation twill, divide its repeat in equal parts and substract one, the result being the number of warp threads in the foundation twill we have to miss in order to obtain the characteristic break. Proceeding by this rule, we find that in connection with a 4-harness twill for foundation, we must skip ($4 \div 2 = 2 - 1 =$) 1 warp thread of said foundation twill to obtain the break.

Using a 6 harness twill for the foundation we have to skip ($6 \div 2 = 3 - 1 =$) 2 warp threads of said foundation twill to obtain the break, i. e., 2 warp threads of the regular twill are to be missed.

In connection with a 8 harness foundation twill skip ($8 \div 2 = 4 - 1 =$) 3 warp threads; in connection with a 10-harness foundation twill skip ($10 \div 2 = 5 - 1 =$) 4 warp threads, etc., these few examples given explaining how to proceed in this manner with any weave for foundation, no matter what his repeat.

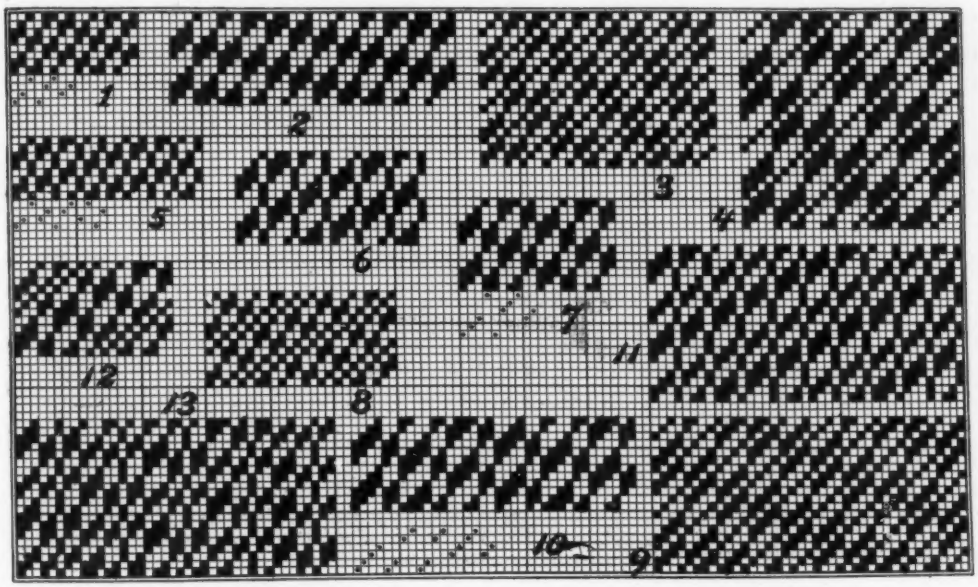
We will now proceed to explain the con-

struction of the skip twills given with this lesson, viz :—

Weave Fig. 1 has for its foundation the $^{2}/_{2}$ 4 harness twill, 4÷2=2—1=1 warp thread required to be missed to obtain break. In this weave the arrangement observed in its construction is: Take two warp threads and arrange break, continuing in this manner until repeat for the new weave is obtained thus: *1*, *2*, 3, *4*, *1*, *2*, *3*, *4*, 1, *2*, *3*, 4 and repeat, the heavy numbers given showing the rotation of drafting the new weave thus: 1, 2, 4, 1, 3, 4, 2, 3 from its foundation weave, the light faced numbers 3, 4, 5, 2, 3, 4; the complete weave repeating on 18 × 6, and which weave by means of draft quoted for its drawing-in draft can be woven on 6 harness.

Weave Fig. 3 has for its foundation the $^{2}1\,^{2}/_{2}\,^{1}/_{2}$ 10 harness 45° twill, the new skip twill repeating on 30 × 10, being obtained by means of drafting 3 warp threads between breaks in the weave.

Weave Fig. 4 repeats on 28 warp threads × 14 picks, and has for its foundation, the $^{3}1\,^{3}/_{3}\,^{1}/_{3}$ 14 harness regular twill, the drafting observed being: take 4 warp threads and skip



previously given indicating the warp threads to be dropped. The draft for thus obtaining the skip twill from its foundation twill being shown by means of ⊡ type below the weave. The new weave repeats on 8 warp threads × 4 picks, but if so required, for one reason or the other, can be woven on 4 harness, using in this case the draft as given below the weave in ⊡ type for the drawing-in draft in connection with the $^{2}/_{2}$ 4 harness twill for harness chain.

Weave Fig. 2 is the skip twill obtained from the $^{2}/_{3}$ 6 harness twill by means of drafting 3 warp threads before break and continuing in this manner until repeat is obtained. The draft is thus: 1, 2, 3, 6, 1, 2, 5, 6, 1, 4, 5, 6, (14÷2=7—1=) 6 warp threads of the foundation twill, keeping on in this manner until repeat of skip twill is obtained, which in turn can be woven on 14-harness.

Weave Fig. 5 shows the first example of irregular (two kinds) of drafting, viz.: take 2 warp threads and skip (4÷2=2—1=) 1 warp thread, take 1 warp thread and skip 1 warp thread, and continue in this manner until repeat of new weave (12×4) is obtained. This weave, if required, can be woven on 4 harness.

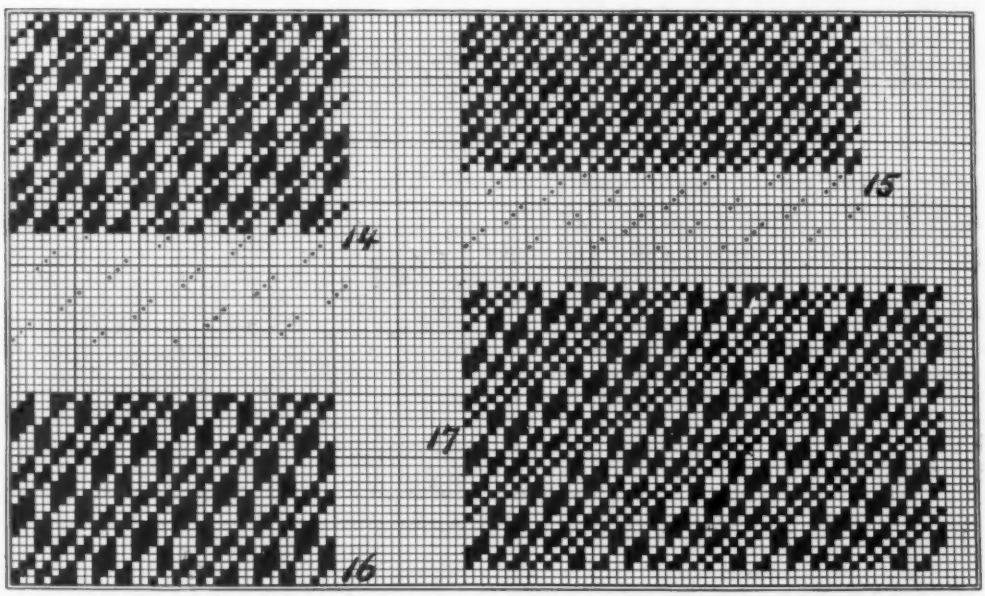
Weave Fig. 6 has for its foundation the $^{2}/_{3}$ 6 harness 45° twill, the new weave as repeating on 12×6 being drafted from its foundation twill thus:

Take 3 warp threads and skip, take 1 warp thread and skip: ×3=repeat of weave.

Weave Fig. 7; repeat 10×6; foundation $^{3}/_{3}$ 6 harness twill; arrangement of drafting:

Take 3 warp threads and skip, take 2 warp threads and skip; ×2=repeat of weave, and which, if so required, can be woven on 6 harness by means of draft given below the weave in ⊡ type for its drawing in draft, to be used in turn with the $^{3}/_{3}$ 6 harness 45° twill for harness chain.

Weave Fig. 8 shows the combination of two



different twills (somewhat corresponding in their appearance, yet different weaves) arranged drafted alternately two warp threads from one twill, two warp threads from the other. The weaves thus combined are the $^{2}/_{2}{}^{1}/_{1}$ 6 harness twill × the $^{2}/_{1}{}^{1}/_{2}$ 6 harness twill. Combining these two different 6 harness twills is caused by reason of neither one of these two twills being pure even-sided twills. Considering either one of these two twills by itself we will readily notice that in the one weave the fine twill line in one effect is above the heavy twill line in the same effect, whereas this point is reversed if considering the other weave. This feature will indicate to us that in combining two such weaves each calls for its own set of harness, viz.: the $^{2}/_{2}{}^{1}/_{1}$ for 6 harness, and the $^{2}/_{1}{}^{1}/_{1}$ for 6 harness, and consequently the combination of both for 12 harness.

It may be well to remark here that no matter what kind of a combination of these two weaves is used, the number of harness required will never be increased, 12 harness being the limit of harness necessary, whenever required to combine these two weaves, may the complete weave not repeat until one hundred or more warp threads. In connection with weave Fig. 8 thus no fancy draft will be available, since the combination of these two 6 harness twills 2×2 repeats on 12 harness, this being, as previously mentioned, the lowest number of harness possible to use.

Weave Fig. 9 has for its foundation the $^{2}/_{1}{}^{2}/_{2}{}^{1}/_{2}$ 10 harness 45° twill, obtained from it by drafting 4 warp threads in succession, and then skip, and continuing in this manner until repeat of the new skip twill is obtained. Repeat of weave, 20 warp threads × 10 picks, but which weave by means of its proper drawing in draft 1, 2, 3, 4, 9, 10, 1, 2, 7, 8, 9, 10, 5, 6, 7, 8, 3, 4, 5, 6, can be woven on 10 harness, using the foundation twill previously referred to as harness chain.

Weave Fig. 10 has for its foundation the $^{3}/_{3}$

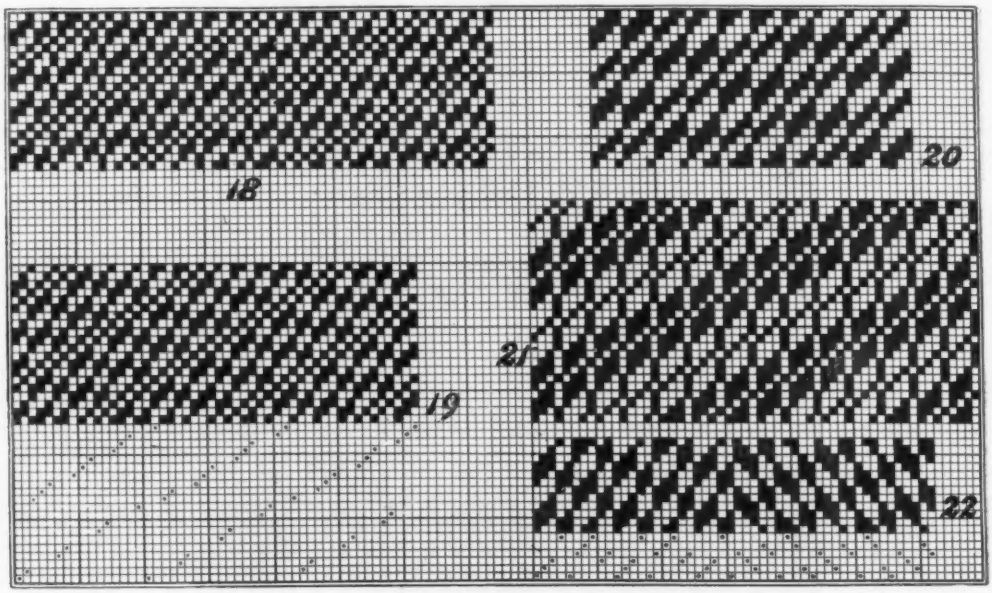
6 harness regular twill, the same being drafted, take 4 and skip (miss 2), take 2 and skip (miss again 2), the new weave repeating on 18×6. The drafting for this weave is shown below it in ⊡ type.

Weave Fig. 11 shows again the combination of two different twills (10 harness in this instance) into one new skip twill, viz.:

Take 3 ends from the $^{2}_{3}{}^{3}_{2}$ 10 harness twill and skip; take 1 end from the $^{2}_{2}{}^{3}_{3}$ 10 harness twill and skip.

ness twill and the heavy numerals to the $^{2}_{2}{}^{3}_{3}$ 10 harness twill.

Weave Fig. 12 shows again the combination of two different twills, viz.: Take 3 warp threads of the $^{3}_{2}{}^{1}_{1}{}^{2}_{3}$ 12 harness regular twill and skip, take 2 warp threads of the $^{3}_{3}{}^{2}_{1}{}^{1}_{2}$ 12 harness regular twill and skip, and continue in this manner, drafting once 3 threads from one twill and then 2 threads from the other twill until repeat for the new weave 20×10 is obtained. It will be readily understood that 20



Repeat of complete weave 20×10, but which weave in this instance on account of its peculiar combination can be woven on 15 harness, since one of these 10 harness twills ($^{2}_{2}{}^{3}_{3}$) has only every other warp thread used, similar like drafting for a 63° twill (see lesson 7 in the . . . . issue of the World Record) and when naturally on account of the foundation twill repeating on an even number of harness (which, however, are the only foundation twills at our disposal) only one-half the number of harness of this foundation twill are necessary for the skip twill obtained, The drafting for the latter skip twill has been thus: 1, 2, 3, *11*, 3, 4, 5, *12*, 5, 6, 7, *13*, 7, 8, 9, *14*, 9, 10, 1, *15*; the light numerals referring to the $^{2}_{3}{}^{3}_{2}$ 10 harness straight draw, in this instance, is the only drawing-in draft possible to use.

Weave Fig. 13 is the combination of the $^{2}_{3}{}^{3}_{2}$ and the $^{2}_{2}{}^{3}_{3}$ 10 harness twills with the following drafting:

3 ends	weave	1	and skip	× 5 = 40 warp threads,
2 ends	"	2	"	
1 end	"	1	"	
2 ends	"	2	"	

repeat of the new skip twill, and which, by means of its proper fancy drawing in draft can be woven on 20 harness.

Weave Fig. 14 has for its foundation the $^{3}_{1}{}^{3}_{3}{}^{1}_{3}$ 14 harness twill, drafted thus: Take 3 and skip, as clearly shown by means of the draft below the weave in ⊡ type. Repeat of

weave 42×14. Number of harness required for its execution, 14.

Weave Fig. 15 has for its foundation the $\frac{2}{1}\frac{2}{2}\frac{1}{2}$ 10 harness twill, drafted thus:

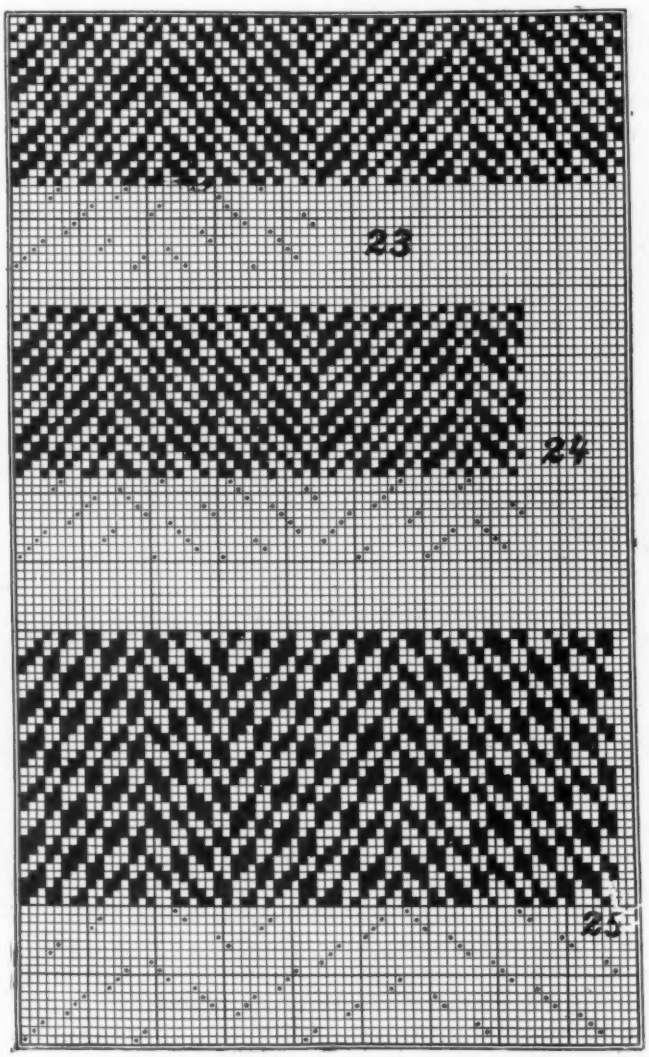
Take 3 ends and skip
Take 2 ends and skip } ×10

Weave Fig. 16 shows again the combination of two twills, viz.:

Take 3 ends of the $\frac{2}{4}\frac{1}{3}$ 12 harness twill
Take 2 ends of the $\frac{1}{2}\frac{3}{4}\frac{2}{1}$ 12 harness twill } ×4

Repeat of weave 20×12.

Weave Fig. 17 shows the combination of the



i. e., until repeat of weave 50×10 is obtained. The draft shown in ⊡ type below the weave clearly shows the construction of the weave as thus explained, as well as providing the drawing in draft for executing the new skip twill on 10 harness.

$\frac{3}{3}\frac{1}{1}\frac{2}{2}$ 12 harness twill and of its mate, the $\frac{3}{1}\frac{1}{2}\frac{2}{3}$ 12 harness twill, drafting alternately the first mentioned weave for 3 threads, and the latter for 2 threads until repeat for the skip twill is obtained.

Weave Fig. 18 is the result of the combina-

tion of two 10 harness twills, drafted rather mixed up in order to obtain a well broken up effect to the face of the fabric; the drafting for the new skip twill being thus:

Take 3 ends	and skip—	Weave No. 1.
Take 2 ends	"	" No. 2.
Take 1 end	"	" No. 1.
Take 3 ends	"	" No. 2.
Take 2 ends	"	" No. 1.
Take 1 end	"	" No. 2.

Continue this drafting 5 times, i. e., until repeat [60×10] of the new skip twill is obtained. For weave 1 use the $\frac{2}{1}\frac{1}{2}\frac{2}{2}$ 10 harness regular twill, and for weave 2 use the $\frac{2}{2}\frac{1}{1}\frac{2}{2}$ 10 harness regular twill.

Weave Fig. 19 is constructed from the same two foundation twills as the previously given weave. Permitting corresponding representations of weaves to hold, we find drafting used to be thus:

Take 2 ends of weave 2 and skip } × 10=50
Take 3 ends of weave 1 and skip } warp threads

i. e., repeat of new skip twill. See ⊡ type below weave for details, the same representing the drafting above referred to, and consequently at the same time is the drawing in draft to use in order to be able to weave the new skip twill.

Weave Fig. 20, repeating on 40×10 has for its foundation the $\frac{2}{3}\frac{3}{2}$ 10 harness twill and the $\frac{2}{2}\frac{3}{3}$ 10 harness twill, drafting alternately 4 warp threads from one weave and 4 warp threads from the other weave, until repeat as mentioned before is obtained. 20 harness fancy draw is required for the production of this weave on the loom.

Weave Fig. 21 has for its foundation the $\frac{3}{1}\frac{3}{3}\frac{1}{3}$ 14 harness twill, drafted thus: Take 3 warp threads and skip, take 1 warp thread and skip; keep on in this manner, drafting once 3 once 1 thread, until repeat of weave 28×14 is obtained.

The next variety in designing these skip twills is obtained by

REVERSING THE DIRECTION OF THE TWILL,

after designing said twill for a certain number of threads in one direction. Weaves Figs. 22, 23, 24 and 25 are given to explain this subdivision of skip twills and of which

Weave Fig. 22 has for its foundation the $\frac{3}{3}$ 6 harness regular twill, drafted thus:

Take 3 warp threads, *twill left to right*, and skip
Take 2 " " " " " " " } × 5 = 25 ends
Take 3 warp threads, *twill right to left*, and skip
Take 2 " " " " " " " } × 5 = 25 ends

Repeat of weave-warp: 50 ends

filling 6 picks, and which weave by means of its drawing in draft given below weave (see ⊡ type) can be woven on 6 harness if so required.

Weave Fig. 23 is obtained from the $\frac{2}{1}\frac{2}{2}\frac{1}{2}$ 10 harness twill by means of drafting thus:

Take 4 warp threads, *twill left to right*, and skip
Take 2 " " " " " " " } = 3 = 18 ends
Take 4 warp threads, *twill right to left*, and skip
Take 2 " " " " " " " } × 3 = 18 ends

Repeat of weave warp: 36 ends

filling 10 picks in repeat of pattern, and which weave, by means of its foundation draw as given below the weave (see ⊡ type) as its drawing-in draft for the loom, can be woven on 10 harness.

Weave Fig. 24 has the same foundation weave as the previously given example, the drafting in connection with the new weave being:

Take 4 ends, *twill left to right*, and skip
Take 2 ends, " " " " " " } × 2 = 12 warp threads
Take 4 ends, *twill right to left*, and skip
Take 2 ends, " " " " " " } × 4 = 24 " "
Take 4 ends, *twill left to right*, and skip
Take 2 ends, " " " " " " } × 3 = 18 " "
Take 4 ends, *twill right to left*, and skip
Take 2 ends, " " " " " " } × 1 = 6 " "

Repeat of weave-warp: 60 ends

filling has 10 picks in repeat of pattern, said weave, by means of its foundation draw given below the weave (see ⊡ type) as its drawing-in draft for the loom, can be woven on 10 harness.

Weave Fig. 25 has for its foundation the $\frac{3}{2}\frac{3}{3}\frac{2}{3}$ 16 harness regular twill, drafted thus:

Take 3 warp threads, *twill left to right*, and skip
Take 2 " " " " " " " } × 4 = 15 ends
Take 3 warp threads, *twill right to left*, and skip
Take 2 " " " " " " " } × 2 = 10 ends
Take 3 warp threads, *twill left to right*, and skip
Take 2 " " " " " " " } × 4 = 20 ends
Take 3 warp threads, *twill right to left*, and skip
Take 2 " " " " " " " } × 5 = 25 ends

Repeat of weave warp: 70 ends

filling, 16 picks; and which weave by means of drawing in draft given below it in ⊡ type, can be woven on 16 harness.

SKIP TWILLS, SKIPPING FILLING WAYS.

This arrangement of skip twills is little used, and if so, only in the most simple arrangements. No special explanation will be required for the fact that turning weaves given "skipping warp ways" 45° will produce this division of weaves.

LESSON.

(1) Produce the skip twill obtained from combining the $^{3}_{2}\,^{1}_{1}\,^{2}_{3}$ 12 harness twill and the $^{2}_{1}\,^{1}_{2}\,^{3}_{3}$ 12 harness twill, using alternately 3 warp threads of each twill and arranging a break (skip) between each change of drafting.

(2) Proceed in the same manner with the $^{2}_{3}\,^{3}_{2}$ 10 harness twill, drafting 3 warp threads and skipping.

(3) Weave $^{1}_{4}$ 8 harness twill; take 5 warp threads and skip. Continue in this manner, drafting until repeat is obtained.

(4) Weave $^{1}_{4}$ 8 harness twill; take 4 and skip alternately with take 2 and skip until repeat of weave is obtained.

(5) Weave $^{2}_{2}$ twill; take 6 and skip, take 2 and skip, take 4 and skip; drafting this way until repeat of weave is obtained.

MANUFACTURE OF SILK FROM FIBRE TO FABRIC.

VIII.

SPUN SILK.—(CONTINUED).

The chief source of raw material for spun silk, however, is the floss, broken and defective ends, as well as the cocoons that either will only partially unreel, or such as are pierced by the escape of the chrysalides or are otherwise defective. Formerly in the manufacture of this silk waste into yarn, it has been the custom to either remove the gum from the filaments at the outset by boiling them in a liquid solvent or otherwise, and then after cleansing and drying them to pass them through suitable mechanism, whereby their transformation was effected, or else to subject them to the action of appropriate mechanism and then remove the gum therefrom at some subsequent stage of the treatment prior to the spinning operation.

In connection with the first procedure referred to, the material will get more or less matted and felted during the boiling out process, and when in turn the separation of the filaments in the after processes of carding, combing, etc., is always accomplished more or less at the expense of breaking said waste into such short length that in some instances up to 50 per cent. are taken out in noils, with a corresponding loss in value owing to the fact that the yarn produced from them has had but little lustre and strength, and hence is used only for the cheaper grades of fabrics.

On the other hand, when the boiling and degumming is done at a later stage in the proceedings, the treatment of the material by the mechanism is of such a character that only loose and partially-opened-up material can be treated, and even with this yarn produced, the requisite lustre is lacking, in consequence of the fact that the constituent strands, which composed the filaments, are separated from each other by the degumming operation before they are bound together in the spinning operation, and as a result thereof they cannot be properly incorporated into the yarn, but project therefrom in the form of fuzz, which thereby detracts greatly from its value.

In order to reduce the percentage of noil made and at the same time produce a perfect smooth lustrous yarn, it is a good plan to first subject the silk waste to the action of a garnett machine, without boiling or removal of gum, with a view to the opening up and separation of both the material composing the cocoons and the remainder of the waste and the breaking of the longer filaments into shorter lengths, which in practice it is preferred should not exceed twelve or fourteen inches. The material as thus treated is next passed through a series of ordinary preparing gill-boxes for the purpose of arranging the filaments in parallel relationship and forming them into a continuous, even, and uniform sliver. From this series of gill-boxes the sliver is next passed to and through an ordinary wool-combing machine, in order to separate out the shorter filaments or noil from the longer filaments, which latter are then converted into yarn, by drawing and spinning, in the same manner and by the same machines as is ordinarily employed in the drawing and spinning of long-fibre wool. The shorter filaments or noil, on the other hand, are next subjected to the action of an ordinary woolen-card, and after con-

verting them into a roving, spun into yarn on an ordinary mule. The different yarns thus produced, boiled off or degummed and then cleansed, are then ready for subsequent use. Instead, however, of thus degumming and cleansing the material in the yarn, where the latter is to be manufactured into fabrics, these steps can be deferred until after the fabric is woven, and then performed in the woven fabric.

By this procedure the felting of the filaments of the silk together, incident to the boiling and degumming of the same, when in an entangled condition is prevented, and also the separation of the ends of the constituent parts of the filaments and consequent projecting fuzz when broken or otherwise, until after they have been formed into thread.

Having in a previous article given the grading of spun silk yarn, we will now consider the counts or

GRADING OF RAW AND THROWN SILK.

The system of calculating or numbering these silk yarns differs from that of other textile threads in this particular, that in the counts of silk the length of the skein remains constant, while the weight is variable.

In sizing raw silk we measure off 20 skeins 476 meters (400 French ells or 520 yards 20 inches) in length, and ascertain the weight of each skein in deniers, the unit denier weight being equal to 0.0531 grms. or 0.833 of a grain. A1-denier yarn, therefore, would be a thread of such fineness that a skein of 476 meters or 520 yds. and 20 inches in length would weigh 0.0531 grms. or 0.833 grain; if one hank weighs 2 deniers or 1.666 grain it is a 2-denier yarn, and so on.

With other textile yarns, cotton, linen, etc., this process is reversed; a skein of given length is then taken, and the number of these skeins required to make a pound constitutes the count of the yarn.

In Europe, thrown silk is graded in the same manner as raw silk, but with American and English throwsters the adopted custom of specifying the counts of raw silk yarns is in giving the weight of the 1,000 yards hank in drams avoirdupois; thus if one hank weighs 5 drams it is technically known as "5 dram silk," and if it should weigh 8 1/2 drams it is technically known as "8 1/2 dram silk." As already mentioned the length of the skeins is 1,000 yards, except in fuller sizes where 1,000 yard skeins would be rather bulky, and apt to cause waste in winding. Such counts of yarn are made into skeins of 500 and 250 yards in length and their weight taken in proportion to the 1,000 yards; thus if the skein made up into 500 yards weighs 8 1/2 drams, the silk would be 17 dram silk; if a skein made up into 250 yards weighs 4 drams the silk would be 16 dram silk. The size of yarn is always given for their "gum" weight; that is, their condition "before boiling off," in which latter process yarns lose from 15 to 30 per cent., according to the class of raw silk used, China silks losing the most and European and Japan silks the least. The following table shows the number of yards to the pound and ounce from 1 dram silk to 30 dram silk. The number of yarns given per pound in the table is based on a pound of gum silk.

LENGTH OF GUM SILK YARN PER POUND AND PER OUNCE.

(From 1 dram to 30 drams.)

Drams per 1.000 yds.	Yards per 1 lb.	Yards per ounce.
1	256,000	16,000
1¼	204,800	12,800
1⅓	170,666	10,667
1½	146,286	9,143
2	128,000	8,000
2¼	113.777	7,111
2½	102,400	6,400
2⅔	93,091	5,818
3	85,333	5,333
3¼	78 769	4,923
3⅓	73,143	4,571
3¾	68,267	4,267
4	64.000	4.000
4¼	60,235	3,765
4½	56,889	3,556
4⅔	53,368	3,368
5	51,200	3,200
5½	46,545	2,909
6	42,667	2,667
6½	39,385	2,462
7	36,571	2,286
7½	34,133	2,133
8	32,000	2,000
8½	30,118	1,882
9	28,444	1,778
9½	26,947	1,684
10	25,600	1,600
11	23,273	1,455
12	21,333	1,333
13	19.692	1,231
14	18,286	1 143
15	17 067	1,067
16	16,000	1,000
17	15,058	941
18	14 222	889
19	13,474	842

20	12,800	800
21	12,190	762
22	11,636	727
23	11,130	696
24	10,667	666
25	10,240	640
26	9,846	615
27	9,481	592
28	9,143	571
29	8,827	551
30	8,533	533

The origin and history of the denier are quite interesting. The denier was a small coin, originally of silver, and was introduced into Gaul by the Romans, probably about the time of Caesar's Gaulic wars. The value of this piece was about 81 centimes. Later the name denier was applied to both gold and copper coins. It has been said that it was the latter which was originally used as a unit of weight, but this is very uncertain. However, this denier, whichever it was, weighed 24 grains Poids de Marc. The old method of grading silk was to take 80 skeins of 120 aunes (giving a total length of 9,600 aunes), and find their weight in deniers (of 24 grains). Towards the end of the eighteenth century, one Matley, observing that the grain was 1/24 of the denier, conceived the idea of taking skeins of 400 aunes (or 1/24 of 9,600 aunes) and weighing these in grains, thus preserving the ratio. He made a machine for measuring these skeins of 400 aunes. The trade accepted the change, but could not get rid of the old term denier, which now became fastened to the new grain weight, so that the denier weight, as we know it today, is really a 1-grain Poid de Marc, and 1/24 of its original value. The present denier or grain weight has a value of 0.0531 grms., metric = 0.833 grain, and the 400 aunes skein is equal to 476 metres = 520 yards and 20 inches.

Another system of grading silk yarns we may now and then come in contact with, is the ounce system, but which is mainly employed in connection with trades other than weaving or knitting, and where thick counts of yarn are required to be used, and which system is based upon the weight in ounces of 1,000 yd. hanks. Silk yarn thus graded is in turn indicated in two ways: for example—a 1,000 yd. hank weighing one ounce can be called either a 1 oz. silk or a 1-thousand silk; a 1,000 yd. hank weighing 16 ounces can be called either a 16 oz. or a 16-thousand silk, etc., etc.

We thus have shown that thrown silk is graded either by:

The denier system,
The dram system or
The ounce system.

To ascertain its equivalent count for a given yarn in one of these three systems, for one or the other two systems will be an easy calculation, for the fact that they are all based upon the principle that the grading by either system varies by a given standard length, the counts increasing in number correspondingly to a thicker yarn.

Denier vice versa Dram. One denier = 0.833 grain or 0.03 dram. Considering its standard length as 520 yds. (which will be sufficiently against its proper length 520 yds. and 20 in.) against the dram standard of 1,000 yds. we thus find 0.03 (= one denier) × 1,000 (standard length of dram basis) and ÷ 520 (standard length of denier basis) = 1 ÷ 17 1/3 Ans., which indicates to us that 17 1/3 denier counts = 1 dram count.

Dram vice versa Ounce. Standard for both is 1,000 yds., thus 16 dram counts to 1 ounce count (since 1 oz. = 16 dram).

Hence:

$17\frac{1}{3}$ denier = 1 dram = $\frac{1}{16}$ oz.
1 denier = $\frac{1}{17\frac{1}{3}}$ dram = $\frac{1}{277\frac{1}{3}}$ oz.
$277\frac{1}{3}$ denier = 16 dram = 1 oz.

Having thus given the relation of the various gradings of raw silk yarn, we may sometimes have occasion to find its equivalent in spun silk or vice versa, a process involving in turn a somewhat more complicated calculation, best explained by three practical examples, thus:

Denier vice versa Spun. Example: Reduce 12 denier to its equivalent counts in spun silk.

$$\frac{17\frac{1}{3} \times 1000 \times 256}{12 \times 840} \quad (16 \times 16, \text{ or drams in 1 lb})$$

$$= 440.21\text{—Ans.}$$

Dram vice versa Spun. Example: Ascertain for 6 dram silk its equivalent in spun silk.

$$\frac{1000 \times 256}{6 \times 840} = 50\frac{20}{63}\text{—Ans.}$$

Ounce vice versa Spun. Example: Get

equivalent counts in spun silk for 1 oz. silk yarn.

$$\frac{1000 \times 16 \text{ (oz. in 1 lb.)}}{1 \times 840} = 19\tfrac{1}{21} \text{—Ans.}$$

To transfer counts of spun silk to that of raw silk proceed thus:

Spun vice versa Denier. Example: Reduce 80's spun silk to its equivalent in denier counts.

$$\frac{1000 \text{ (standard of denier hank)} \times 17\tfrac{1}{2} \times 256 \text{ (drams 1 lb)}}{80 \text{ (counts given)} \times 840 \text{ (standard of spun silk)}} = 66\tfrac{3}{16} \text{—Ans.}$$

Spun vice versa Dram. Example: Ascertain its equivalent count in dram counts for 100 in. spun silk.

$$\frac{1000 \times 256}{100 \times 840} = 3\tfrac{4}{84} \text{—Ans.}$$

Spun vice versa Ounce. Example: Reduce 20 in. spun silk to oz. counts.

$$\frac{1000 \times 16}{20 \times 840} = \tfrac{20}{21}, \text{ or nearly 1—Ans.}$$

The counts of silk yarn met with in the market vary considerably with the place of its origin; as a rule the finest counts having the greatest value. The average limits within which the silk fluctuates is: Raw silk 9 to 30 deniers, Organzine 18 to 34 deniers, Tram 24 to 60 deniers, Wild silk 100 to 300 deniers; however, these limits are not fixed, and are frequently varied in either direction. The individual cocoon filament reels about 2 1/4 deniers, consequently the number of deniers in the grege is somewhat more (2 : 2 1/4) than double the number of cocoon filaments used in the formation of the thread; thus, if five cocoons are reeled together, a grege of (2 1/4 × 5 = 11 1/4 = practically 11) 11 deniers will be the resulting silk thread.

During the process of reeling the cocoon filaments, the latter may, for one reason or the other, run out previous to starting another cocoon; again, to make up for the filaments that have been left out during the reeling, the operators may add extra cocoons, thus making the grege heavier than it should be; again, they may neglect to add the cocoons at the right time; thus it will be readily understood that it is practically impossible to produce a thread absolutely true in count throughout the entire skein, again variations being more likely to be greater if samples are taken from different parts of the bale of silk. Owing to this variation in the size of silk, a better idea of the average size of a lot of silk under consideration is obtained by taking the average of several tests from different parts of the bale or from different parts of the same skein. These irregularities in silk make it necessary for commercial transactions to permit a variation of from one to two deniers in any lot of silk under consideration, thus grege will be sold as 12 to 14 deniers, and organzine 20 to 22 deniers, by which is understood that the lot of silk thus designated will reel within the limits indicated.

However, it must be remembered that irregularity of silk considerably affects its value, and that for certain fabrics it is absolutely necessary that these variations are confined within narrow limits. By reeling separately 20 skeins of 500 metres each (about 547 yards) as is done in the large conditioning houses, a good idea of the average size of a lot of silk under consideration is obtained; this procedure being a test superior than if we would make ten tests of 1,000 metres each, although the total length of the silk selected for the tests would be the same in both cases. It must be remembered that silk which has gained its weight by conditioning, will lose a portion of its value in the operation, since the value of the silk, as previously mentioned, is determined by its fineness, and when consequently any increase of weight will reduce its value per pound. This feature is somewhat a guarantee against unduly weighting of silk, since a portion of the gain represented by the increase of weight is at the same time lost by the decrease in the value per pound.

With reference to conditioning silk, the skeins after having been reeled and weighed, at first together, and then separately, are then dried in ovens, and when a certain percentage of moisture, equal to 12 parts of water for each 100 parts of dry silk is then added. The size of the silk thus treated is called its "conditioned count."

Practice has shown that, except in certain extreme cases where the silk is coarse or hard twisted, it is not necessary to employ

this conditioning, since fine silk reeled in an atmosphere of a normal temperature and moisture is quickly brought to the same conditioning as the surrounding air, as regards humidity. However, with coarse or hard-twisted silk, equilibrium of moisture is not restored during reeling, and in which instance conditioning of such silk is made use of in order to determine the "conditioned count" of the yarn.

The count of silk yarns most advantageous to use depends upon the class of fabric being woven.

With reference to taffetas a somewhat low set of warp, with a coarse size of raw silk is used; however, a difference must be made between light and heavy qualities of them.

The setting of these fabrics in the reed is a most important item, and must carefully be taken into consideration by the manufacturer. This feature is best explained by means of a practical example, for which reason let us consider a structure made with warp texture of 240. Now there are two reeds at our disposal, viz.:

Reed 80 × 3 (80 × 3 = 240) or
Reed 60 × 4 (60 × 4 = 240).

It certainly will be a known fact to the experienced manufacturer that he cannot use the latter given reed, since in that case he would obtain what is known as a "reedy cloth," i. e., a fabric showing reed marks, since the warp texture is not sufficiently high to give "cover" to the structure. The 80's reed, however, will help him over this trouble. Above the 240 warp texture, however, he then can use: reeding 4 ends per dent. For example, a warp texture of 280 he naturally will reed thus: (280 ÷ 4 = 70). Reed 70 at 4 ends per dent.

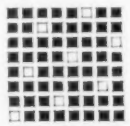
Now with reference of kind of silk to use, the best is naturally a good Italian, well twisted organzine, although for light qualities and low texture a Japan silk will fill the bill, whereas Chinese and Canton silk are out of the question, for the fact that the counts required for taffetas are rarely found in them, and besides this kind of silk is too tough.

Provided a 70's reed is use, 24 to 28 denier silk is a good count. If dealing with extra heavy goods remember that it is a good plan to enter double ends, resulting in turn in a more salable structure. By this we mean that for example a reed 70 × 4 double ends will give better results than reed 70 × 8 ends single. For jacquard work a proportional coarser count of silk yarn can be used with good results. Again such coarse yarns are easier dyed, and in turn weighted, than higher counts; in the latter instance taking into consideration that it is not practical to weight 20 denier silk above its weight in the gum and 24 denier silk above 30 per cent. For the filling use a three or more ply tram silk. 120 picks per inch, three ply 26 denier tram will give a good structure.

In connection with a well covered design, four ply 46 to 50 denier Canton tram silk may be used, since on account of the four ply, the natural rough character of said Canton silk is well taken care of and a good fabric structure the result. The advantage to the manufacturer in thus being able to use Canton silks rests not only in the fact that it is a cheap yarn, but that at the same time it winds and spools readily, more particular in connection with weighted yarn, again that the average percentage of waste made compares favorably with that of other silks.

In connection with yarn dyed, as well as piece dyed satins, a high texture and fine count of yarn (about 17 to 18 denier) is generally used; say 100 dents as a limit in connection with a dyed yarn, well twisted yarn and not weighted too excessively. Never weight your blacks above 60 per cent. and other color above weight in gum. Never weight the latter kind of silk yarn if intended to be used in connection with a cotton filling (half silk), for the fact that the high finish such fabrics later on are subjected to, neutralize the effect of weighting. However, in connection with half silk blacks, the warp is weighted. In connection with all silk satins the weighting of the silk will be an advantage to the structure, the same giving to the fabric a better handle. In this case we may also use a coarser count of yarn and reed without any disadvantage to the fabric. If dealing with an eight leaf satin (the common weave used) remember never to reed 3 ends in a dent, or a reedy fabric will be the result. For example, a fabric to be constructed with

228 ends (16 to 22 denier silk) will thus call for reed 57 × 4 for the fact that the 76 reed



(8 leaf satin.)

at 3, cannot be used for reason stated before; neither can a 114 reed at 2 ends be used, for it would not weave, hence reed 57 × 4 is the only reed possible to use in this instance, taking at the same time into consideration that a 16 to 18 denier silk will produce a better fabric structure than if using 20 to 22 denier silk, for the fact that in the first instance more warp is used, a feature which in connection with the low reed we must use will thus result in the better "cover" to the fabric. With reference to piece dye satins, reeds up to 160 can be used in connection with the 8 leaf satin. For example a warp texture of 320 we then can reed 160 × 2 being in this instance enabled to use a much finer count of silk than if we would use reed 80 at 4 ends, obtaining in turn a cheaper fabric structure on account of less warp yarn per yard of cloth required.

(To be continued.)

THE INSPECTING, BURLING AND MENDING OF WOOLENS AND WORSTEDS.

INSPECTING.

Although fabrics receive a perching, i. e., inspecting and measuring at the weave room, before they leave for the finishing room, yet said examination is, as a rule, not sufficiently reliable to have the finisher shoulder responsibilities, the same being more or less only performed for keeping the wage list of the weavers (Find's) correct, or detect as quickly as possible imperfections in fabrics requiring at once prompt attention at the loom. In some mills a "sewing-in" department is connected with the weave room, whereas in others not, in the latter case the time required for correcting weavers' mistakes (Find's) being then in turn charged by the finishing department against the fabric in question, i. e., the weave room and in turn against the weaver.

It will be advisable for every finisher to have each and every piece of fabric inspected by a responsible percher under his charge. As will be readily understood, a good light (a good N. E. light in connection with large, clean windows) is the most important requisite for the inspector to do this work, the other being a perch over which the fabrics are examined, and which consists of two rolls set in a frame, fastened to the ceiling of the room, in such a manner as to bring the fabrics, when pulled over the perch, squarely in front of the window. The fabrics are then pulled (by the inspector standing on one side and his assistant on the other side in front of the fabric to be examined) slowly over this perch, both persons at the same time examining the fabric carefully as to imperfections. These may either be caused by carelessness of the weaver, the imperfect running of the loom, poor yarn, etc.; however, no matter what was the cause, it is the work of the inspector to detect these mistakes which require later on fixing in the fabric, and when found, mark them prominently with chalk for the purpose of calling the attention of the sewer-in girls to such places, whose work it is to darn and fix up such places, giving at the same time in connection with bad cases directions how to correct them.

The aim of the inspector should be to bring the goods out as nearly perfect as possible, and to have at the same time as few allowances as can be had. When the face of a fabric has been examined, the same is done with its back. In some instances, in connection with light weight fabrics, the latter are examined from behind the goods, the inspector or more often his assistant, for this purpose changing his position by stepping in between the two runs of the cloth, and which thus brings one of the runs of the fabric between him and the light, in turn enabling him to look through the fabric, and consequently readily detect any imperfection. When the inspector has thus carefully examined the fabric, and marked all imperfections, the piece is then rolled up and placed on a pile from which, in time, it passes to the burling process.

BURLING.

The burlers, who are girls, and who usually

work in connection with 6/4 goods, in pairs together on a table, take the piece, and carrying it to their table, there unroll it and commence to examine the fabric with its back up, for such imperfections as knots, bunches, runners, etc., using for this purpose both the eyes as well as their fingers, and in fact the latter more particularly.

The tables used for burling must be smooth, so that the burlers, when feeling for the knots or bunches, etc., will not come in contact with obstructions on the surface of the table, a feature which in turn would only create a loss in time, and in turn give rise to carelessness on the part of the girls by getting fooled.

The burling table should have its top fastened by hinges on one side to the framing, thus permitting the tipping of the top to any angle to suit the size of the girls; the top being held in this proper angle by suitable movable braces, placed on both sides of the table. This also permits the top to be let down level when the piece is finished, the girls then folding the fabric on the top of the table before taking it away. In some mills (although a question if advisable) the tops of the tables are covered with zinc so that a perfectly smooth surface is obtained. In this case, however, care must be exercised that this covering, when wearing out, is promptly repaired, or the entire top recovered to prevent damage to the cloth as burled over it.

The same as with any other hand operation, the use of the proper tool is of the greatest importance, and which tool in the present instance is the burling iron, which for this purpose should be ground flat on the sides and come to a sharp point, since if the sides are ground flat, the edges thus given the iron will cut the threads easily and this with as little strain as possible on the threads, hence these irons should never be allowed to become worn on their edges, and neither as to point. Besides proper burling irons, a good pair of scissors are also needed by each girl, to use them when cutting off knots, which never should be pulled off, since by this procedure the respective threads in the fabric would become unduly tightened, and when released crawl back in the structure and leave an imperfection, i. e., a space without a thread, and consequently a chance for an imperfection in the finished fabric.

All the knots which have been tied in the threads during winding, dressing, beaming, weaving, must be looked and felt for during burling, and carefully drawn by the girls to the surface and then clipped off, leaving the ends long enough so that no space without a thread will occur. Threads which are found loose on the face or back, caused by the weaver having tied in a broken end, should be cut off and not pulled off, especially so if the thread in question has been interlacing tightly; however, threads possibly interlacing loosely should be pulled to their proper position first. Bunches must be drawn out a little at a time so as not to disturb or strain the thread to which it adhered, or the surrounding threads. The same care must be exercised with runners, as caused by the filling having been drawn in for one or more inches at the selvage, into the fabric.

After the back of the piece has thus been carefully burled, the face is next taken in hand by the burlers. Here the removal of knots is attended to with more danger than on the back, it being usually sufficient to draw the knots to the surface and leave them there for the shear to clip them off. Bunches in the yarn and runners of the filling will also require considerable attention on the part of the girls, in removing them carefully so no harm to the fabric is done. All places where runners have been taken out should be marked so that the sewer-in later on can examine such places to see if it has been done in such a manner as to cause no damage to the joining picks. In other words, each knot or other imperfection is removed either from back or face, wherever most prominent or the easiest to get at it, when dealing with single cloth structures, whereas in connection with double cloth fabrics, the place, i. e., whether face or back, is properly defined as to which section of the fabric the imperfection is located in, as will be readily understood from the construction of these fabrics. After the piece has been thus burled, the same is treated on both sides, and everything folded and placed on a pile in connection with other

fabrics similarly burled, and from where, in time, it is then removed for the next operation, darning and mending.

DARNING OR MENDING

or also called sewing-in is, as a rule, only done by experienced girls or women in that work; in fact, the person must be what we may consider an expert with the needle, in order to do perfect work. The object of darning is to bring the goods up to perfection before they are allowed to undergo finishing. It is a good plan, where sufficient room is at disposal, to give each sewer-in the use of a perch for doing her work, since this will facilitate perfect work. Again, if the person knows weaving, such knowledge will also benefit her in her labor. On "fancy" work it is essential that the sewer should understand the colors as used for producing the various effects in the fabric and have a good eye for imitating the latter, taking adjoining patterns for reference, both as to the interlacing of the threads as well as the coloring, thereby making a nearly perfect affair of some of the most imperfect places, certainly work which requires experience as well as attention. On plain or mixes, the weave alone will only come under consideration, all kinds of sewing-in being more or less regulated by the kind of final finish of the fabric, thus indicating that a different, more exact work is required for a threadbare fancy fabric requiring little, if any, finishing than if dealing with a face finish and where gigging, i. e., the nap will cover many imperfections, never to be noticed in the finished fabric. The work, however, is tedious in the extreme and trying to the eyes, however experience comes to the aid of the person and after a while imperfections are corrected to a nicety which formerly appeared hard or impossible to be remedied. It will be also a good plan to regulate the work, giving the hardest styles to be mended to the most experienced hands.

With reference to some kinds of plain, face finished fabrics, the cutting out of good picks, in place of sewing-in a missed pick, is frequently resorted to, for the fact that the sewing-in of mispicks is generally found to be too tedious. To do this requires a knowledge of cloth construction (weave formation) in order to know which picks have to be cut and which not, and unless this is well understood by the sewer-in, it is best not to attempt it; in fact, it is no use for the sewer-in to attempt anything in the line of darning unless it can be made to look in the finished fabric sufficiently perfect that an allowance need not be made, otherwise the whole labor spent in mending the imperfection has been lost time, and consequent waste in money to the mill. Never attempt to do the impossible.

After the piece is thus mended, i. e., all mistakes possible to be correctly attended to, the fabric is folded and put on a pile with the other fabrics previously treated in the same manner, to lay until required for the fulling mill or washer as the case may be.

TACKING.

This process is used in woolen mills in connection with fabrics requiring "flocking" at the fulling; however, there are any number of woolen mills who use tacking successfully in connection with all their fabrics requiring a considerable amount of fulling, using flocks or no flocks, hence it may be a good plan for mills not using this process to give the matter some thought.

Tacking, as is resorted to in connection with flocking the goods during fulling, has for its purpose to protect their face from taking up some of the flocks direct, most of which during the process of finishing the face would only be lost again; at the same time introducing flocks onto the face of the goods will vary the shade of the individual pieces, since the color of the flocks varies constantly, thus making it hard to match the goods for filling a case. However, some mills have learned that in connection with goods as require no flocking, but have to run in the fulling mill for some time, tacking them will protect their face from chafing during fulling, and anything that will protect the face of the fabric in this manner cannot help but have a beneficial effect upon the general appearance of it in its final finished state.

In order to thus protect the face of the fabric, it is necessary in the first place to double the goods, with their face inside, and then sew their selvages together, and which is done either by hand or by means of a sewing machine.

Tacking by hand is generally done by boys, who, as will be readily understood, have to be watched closely in order that they do their work right. There are two ways of stitching the selvages, viz.: either take a stitch through the lists every three or four inches, using a continuous string of twine for this purpose, pieced out as the boy proceeds with his work, or run needle and thread simply through the two selvages and tie a knot to the string, and cut the latter, repeating the affair every three or four inches. By the latter method there will be no chance for the loops of the twine to catch in the fulling mill, besides quite a saving in twine will be made, while the work will be quite as effective, if not more so, as in the first mentioned case, for if the loops of the continuous twine should catch at a projection in the fulling mill, the twines will break and release quite a number of stitches, thus leaving the face of the fabric more or less exposed, the same as if the goods were not tacked at all.

The advantage of tacking by a sewing machine in place of tacking by hand, is that the stitches thus made are of uniform size, and at the same time small enough to answer the purpose excellently. There are two different types of sewing machines built for this purpose.

The one style of machine doubles the fabric, and, after sewing the selvages together, folds the fabric in a pile, so that all the operative has to do is to wrap the end around the piece, and place it in the pile with previously tacked pieces, ready for the fulling mill. The doubling in this machine is accomplished by pulling the fabric over a frame which stands upright about six feet, and has a roll at the top, over which the cloth is drawn. A friction attachment is supplied to this roll, in order to put tension onto the fabric and thus bring its two sides evenly together. An iron bar runs slantingly from below this top roll to a point about 40 inches from this frame, and to about the same height from the floor as the sewing machine attachment. The end of the fabric is then pulled down and its two sides placed together below the iron bar, previously referred to, and in turn brought forward, and into the action of a pair of feed rolls of the machine. The sewing is not started till about a yard of the fabric has been pulled through, and then the selvages are brought under the machine and stitched. As the cloth passes on it is brought into the action of a pair of draft rollers as situated above the folder, and which take the fabric from the sewing machine as fast as sewed and delivering it into the folder, which in turn, folds it off nicely behind the sewing machine.

The operator, then, simply has to guide the fabric in its travel through the machine, being careful to watch that the sewing is done into the selvages and not in the cloth itself, i. e., that the cloth travels in its proper path to the sewing machine. The neater the fabric has been folded previous to coming to this sewing machine, the easier the work at this machine.

The other style of sewing machine previously referred to for automatically tacking, i. e., sewing the two selvages together is constructed minus the doubling and folding attachment for the fabric, but which machine, with a little care on the part of the operator, can be made also to do good work. Its principle of construction is identical to that of the cotton mill sewing machine, as used for sewing the ends of pieces together, when the fabric is threaded in a gig, napper, shear, etc., with the exception that the ring which acts as a feeder is extended into a drum, of the width of a doubled piece of cloth. This drum contains pins to hold the cloth in position and also a guide for the edge of the selvages, so that when the latter comes in contact with this guide, as the goods are fed to the drum and sewing machine, the sewing is sure to be done in the centre of the selvages. In order to operate this style of a sewing machine to its best advantage, be sure that the piece of cloth to be tacked is laid down back of the operator, in line with the needle bar of the machine, and this as far back as space will allow. This arrangement will bring the two selvages on a line and in turn save the operator much pulling, in fact, will permit him to double the fabric, ready for sewing, as fast as the machine can handle it.

After the fabric has been tacked, roll it into

a compact bundle, and place it on the pile with other pieces, thus previously treated, until in its turn it is taken to the fulling mill.

NOVELTIES FROM FOREIGN SOURCES.

Worsted Melton Suiting.

Complete Weave. Repeat 52×62.

Warp: — 3630 ends.

Reed: — 14
- 3 dents @ 4 ends.
- 1 dent " 2 "
- 3 dents " 4 "
- 1 dent " 3 "
- 5 dents " 4 "
- 1 dent " 3 "

14 dents @ 52 ends = 70 inches wide in reed.

Dress: —

12 ends, worsted, 36's brown and 64's drab, twist..... = 12 ends
1 end, worsted, 64's green and 36's brown twisted over with 64's drab..... = 1 end
51 ends, worsted, 36's brown and 64's drab, twist..... = 51 ends
1 end, worsted, 64's green and 36's brown twisted over with 64's drab..... = 1 end
39 ends, worsted, 36's brown and 64's drab, twist..... = 39 ends

Repeat of pattern: 104 ends

Filling: — 55 picks per inch, arranged thus:

1 pick, 2/52's worsted black and green twisted with 2/64's worsted brown..... = 1 pick
61 picks, 2/36's worsted dark brown..... = 61 picks
1 pick, 2/52's worsted black and blue twisted with 2/64's worsted brown..... = 1 pick
61 picks, 2/36's worsted dark brown..... = 61 picks

Repeat of pattern: 124 picks

Finish: —Full slightly, scour, dry, clip on shear, press, steam lustre, press and steam. 56 inches finished width.

Worsted Suiting.

Complete Weave. Repeat 4 × 4.

Warp: —3930 ends, 8 harness straight draw.

Reed: —15×4=65½ inches wide in loom.

Dress:—

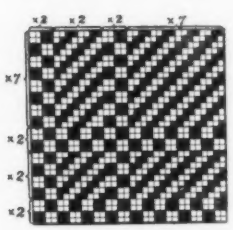
7 ends, 2/36's worsted, gray..... = 7 ends
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 3 = 6 ends
1 end, 2/36's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end
1 end, 2/36's worsted, black }
1 end, 2/36's worsted, gray..... } × 2 = 4 ends
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 3 = 6 ends
1 end, 2/36's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end
2 ends, 2/36's worsted, black..... = 2 ends
1 end, 2/36's worsted, gray..... }
1 end, 2/36's worsted, black..... } × 2 = 4 ends
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 3 = 6 ends
1 end, 2/36's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end
1 end, 2/36's worsted, gray..... = 1 end
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 3 = 6 ends
1 end, 2/36's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/36's worsted, gray..... = 1 end
1 end, 2/64's worsted, blue..... = 1 end
1 end, 2/36's worsted, gray..... = 1 end
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 3 = 6 ends
1 end, 2/36's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end
2 ends, 2/36's worsted, black..... = 2 ends
1 end, 2/36's worsted, gray..... }
1 end, 2/36's worsted, black..... } × 2 = 4 ends
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 3 = 6 ends
1 end, 2/36's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end
1 end, 2/36's worsted, black..... }
1 end, 2/36's worsted, gray..... } × 2 = 4 ends
1 end, 2/36's worsted, black..... = 1 end
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white } × 2 = 4 ends
1 end, 2/64's worsted, gray }
1 end, 2/64's worsted, black, twisted over with 300/2's silk, white..... = 1 end

76 ends

Filling:—57 picks per inch, the color, counts of yarn being arranged the same as in the warp.

Finish: — Worsted finish, 56 inches wide.

Worsted Suiting.



Complete Weave. Repeat 144×144.

Warp:—5340 ends.

Reed:—20×4=67 inches wide in reed.

Dress:—

1 end, 2/64's worsted, dark gray..... }
2 ends, 2/64's worsted, gray and white.. ..... } × 2 = 8 ends
1 end, 2/64's worsted, dark gray..... }
1 end, 2/64's worsted, gray and white..... }
1 end, 2/64's worsted, dark gray..... } × 8 = 16 ends
1 end, 2/64's worsted, dark gray..... }
2 ends, 2/64's worsted, gray and white. ..... } × 2 = 8 ends
1 end, 2/64's worsted, dark gray ..... }
1 end, 2/64's worsted, dark gray..... }
1 end, 2/64's worsted, gray and white..... } × 27 = 54 ends
3 ends, 2/64's worsted, dark gray..... = 3 ends
1 end, 2/64's worsted, gray and white..... }
1 end, 2/64's worsted, dark gray ..... } × 27 = 54 ends
1 end, 2/64's worsted, gray and white..... = 1 end

Repeat of pattern: 144 ends

Filling: — 75 picks per inch, arranged thus:

1 pick, 2/64's worsted, dark gray..... }
2 picks, 2/64's worsted, gray and white... ..... } × 2 = 8 picks
1 pick, 2/64's worsted, dark gray..... }
1 pick, 2/64's worsted, gray and white.. ..... }
1 pick, 2/64's worsted, dark gray..... } × 8 = 16 picks
1 pick, 2/64's worsted, dark gray..... }
2 picks, 2/64's worsted, gray and white..... }
1 pick, 2/64's worsted, dark gray..... } × 2 = 8 picks
1 pick, 2/64's worsted, dark gray..... }
1 pick, 2/64's worsted, gray and white..... } × 56 = 112 picks

Repeat of pattern: 144 pick

Finish: — Worsted finish, 56 inches wide.

CORRESPONDENCE AND NOTES

Upon Textile Topics at Home and Abroad.

THE LABOR COST OF FINISHING WOOLENS.

BY FINISHER.

To determine the labor cost of finishing woolens of any description is in itself a very simple problem and can be easily arrived at by the veriest novice in the business, for it is only necessary to find the number of yards finished for a given or average period and the total cost for labor in this department for the same period. Divide one by the other and the result will be the actual cost for labor for one yard of cloth finished. It is often argued, however, that the great variety of woolen goods made, makes it impossible to arrive at a safe average of the labor cost per yard of cloth. This is undoubtedly true. The labor cost per yard of cloth differs greatly on the same quality of goods in different mills. It goes without saying that a yard of good quality of kersey cannot be finished at as low a labor cost as a yard of union cassimere, but after all it often happens that a kersey is in reality finished at a less cost for labor than a yard of union cassimere. As stated it depends in a great measure upon the place where the goods are handled. This of course brings the matter down to a question of management and it is in this direction where the difference in the cost must be explained.

As an illustration of this point we will give the result of finishing a yard of medium grade kersey in two different mills, and in order to arrive at a fair average, a period of six months has been selected. This covers part of the slack season and part of the rush season. In the first mill the account at the end of six months stood thus: Production for first month, 15,243 yds.; second month, 14,348 yds.; third month, 16,252 yds.; fourth month, 17,276 yds.; fifth month, 19,248 yds.; and the sixth month, 18,349 yds.; making a total for the six months of 100,516 yds.

During this time there were employed in the finishing room:

1 overseer, at	$3.00	per day.
1 percher, at	2.25	per day.
1 shearer, at	1.75	per day.
1 gigger, at	1.75	per day.
2 helpers, at $1.25 each	2.50	per day.
1 fuller, at	1.50	per day.
1 helper, at	1.25	per day.
2 men at washer, at $1.25 each,	2.50	per day.
1 man for steaming and wet gigging	1.50	per day.
1 helper, at	1.25	per day.
1 dryer tender, at	1.00	per day.
1 general helper for wet end of room, at	1.25	per day.
1 boy for brush, at	1.00	per day.
1 man at press, at	1.25	per day.
1 man for general work at dry end	1.25	per day.
2 burlers and 1 sewer, at $1.00 each	3.00	per day.
4 speckers, at 75 cents each	3.00	per day.
Total,	$31.00	per day.

The working period was 26 days for the first month, 27 days the next, 25 days the third, 24 days the fourth, and 26 each for the fifth and sixth months, making in all 154 days at $31.00 per day, a total of $4,774.00 for the finishing of 100,516 yards of cloth, or 4 3/4 cents per yard. It will be observed that the wages paid the different employees were equal to the average, and the production shows that the help were fairly well employed during the whole time.

At the second mill where the cost per yard was obtained, the conditions were somewhat different, although the goods made were of the same grade and quality and the finishing capacity of the mill in point of number of

looms was equal in all respects to the first-named mill. Here was found:

1 overseer, at	$2.75 per day.
2 shear tenders, at $1.50 each,	3.00 per day.
2 fullers, at $1.50 each	3.00 per day.
2 helpers, at $1.25 each	2.50 per day.
2 giggers, at $1.50 each	3.00 per day.
1 helper, at	1.25 per day.
2 men at steaming, at $1.25 ea.,	2.50 per day.
2 men around room, at $1.25 each	2.50 per day.
2 boys on dryer, at 75 cents each	1.50 per day.
1 man at extractor	1.25 per day.
1 man at brush	1.25 per day.
1 man at press	1.25 per day.
2 men at perch, at $1.25 ea.	2.50 per day.
1 helper, at	1.25 per day.
4 burlers, at 75 cents each	3.00 per day.
2 sewers, at 75 cents each	1.50 per day.
6 speckers, at 75 cents each	4.50 per day.
Total,	$38.50 per day.

The production for six months was 12,350 yds., 12,875 yds., 13,425 yds., 15,280 yds., 14,320 yds. and 13,890 yds., making a total of 82,140 yds. The working time for the six months was 155 days, as follows: 26, 26, 25, 26, 26, 26, thus bringing the cost to $5,967.50. This divided by 82,140 yards gives the cost per yard 7 1/5 cents, nearly. These two instances of the actual cost for labor furnishes much material for careful study, and to one not conversant with the conditions obtaining in mills it will hardly seem credible that such a difference could exist. Let us, therefore, add a few words by way of explanation. The figures given above are taken from personal experience, and the difference found in the two places cannot wholly be laid at the door of the finishing department. In both places the finishing was kept up to the looms so that in the case of the second named mill the help must have had an easy time of it, while at the first mill things were on a hustle to keep up with the looms. This shows that the production of the second mill might have been larger and the showing in the labor cost much more favorable.

The second mill could not come up to the standard of the first mill and it is a question if it could have handled the amount of cloth which was put through the first mill with less help. The number of burlers employed in the second mill indicates that the cloth came to them from the looms in a much poorer condition than at the other mill. This indicates that either the preparatory work was sadly neglected or the management were trying to produce an article from inferior stock, thus trying to increase their profits. This turned out as it always will, for it is a pure case of saving at the spigot and wasting at the bung hole. The management of the finishing department was practically located in the office and the overseer, an otherwise capable man, had, as a result of this, little or no control over the help. As a usual thing when the office undertakes to manage the details of a room, the result is anything but pleasing, however nice it may be to the help. A capable overseer may find himself in a position where he is compelled to accept less pay for his service than what he deserves. This is a sure indication that the management simply want a figurehead and intend to do the managing themselves, with the result as indicated above.

In the case of the first mill the overseer was hired to run the room according to the best of his ability with a view of having his wages increased if results would warrant it, which they did. No interference from the office was in evidence. This man then set to work to produce goods at the lowest possible cost to his employers without making a driver of himself. He managed the room in such a manner that his help was steadily employed from one end of the week to the other. There were no idle hands breeding mischief and it can be stated as a fact that it is much easier to run a room satisfactorily with all hands steadily employed, than when idle hands are around. The facts as represented by the foregoing illustrations are a fair criterion of conditions existing in many of the woolen mills of the New England States at the present time and show conclusively that it is an impossibility to come anywhere near the actual labor cost of finishing as applicable to more than one mill.

The problem of finding the labor cost of a certain fabric in places where more

than one kind of goods are made, becomes at once far more complicated, for in such cases the various processes through which the goods have to pass differ materially, and it will not do to figure on the whole production to find the labor cost per yard and then take this as the actual cost per yard of any one fabric. For instance, take a mill producing beavers and union cassimeres; it must be at once apparent that the labor cost for finishing the beavers is far higher than that for finishing the cassimeres, and therefore it must be determined what the true labor cost of each fabric amounts to. To do this it is necessary to find the actual time consumed by each fabric in the different processes through which it passes, and from this arrive at the actual cost per yard. To this result must be added a certain percentage to allow for such time, as the help in either of the processes are not fully employed, but have their pay going on just the same.

Right here it is well to observe what really must be considered as entering into the labor cost of any article. It is not sufficient to simply figure the expenditure of money for labor for a given number of yards produced, but in order to be safe it must be determined whether such production has been made under conditions which represent a fair average of capacity which can be relied on at all times. Therefore in order to be safe any cause tending to keep the help in idleness or which interrupts the smooth flow of production must be taken into consideration.

It matters very little to the average man how many yards he turns off in a day, in the process upon which he is engaged, so long as the pile ahead of him does not become too large. When he sees it diminishing too fast for any cause whatever, the chances are that he will regulate his production in accordance with the prevailing conditions. Still his pay is just as large at the end of the day as if he had produced more. This may be observed all along the line for it is seldom that a hand is made to go home for any period of time for such a cause unless the accumulation happens to be too large. The breaking down of any one of the machines used in the various processes will tend to keep back not alone those following, but also cause the goods to pile up ahead of it. While the latter may be counterbalanced by a little extra exertion after things have been fixed up, there is sure to be some shortage in the total production.

If, however, the whole department is put into idleness on account of any accident to the motive power of the plant, it is sure to produce a shortage of production which in the nature of the case must tend to enhance the actual labor cost. This fact is taken account of by many concerns and in most of the larger establishments such lost time is required to be made up. Even the law takes notice of the justice of this proceeding in a certain measure by regulating such action on the part of the employer. How far these methods are successful is an open question and it is quite pertinent to quote a certain successful manufacturer who is on record as saying most emphatically that, "Overtime work, no matter for what reason, is the most expensive method of producing that can be adopted." From actual observation we are inclined to accept this statement as literally true and firmly believe that no concern ever made anything by working its help overtime, especially in cases where it is intended to make up lost time for causes such as mentioned.

However it matters little in the end so far as the labor cost is concerned, whether one method or another is adopted, the fact still remains that every cent which is paid out for labor in any one department goes to swell the cost per yard whether such work is directly due to the processes or is connected with it indirectly. For these reasons it is plain that unless great care is exercised the results of figuring on such cost are going to be anything but correct.

In almost every finishing room some help are found which have to perform more than one kind of work pertaining to the process of finishing, and, therefore, it is very hard to figure on the cost of any one process. Of course it can be done, but after it is done it is a question whether the labor entailed is not worth considerably more than the results obtained. Usually, where these things are figured down fine, it is found after actual test that the figures are very wide of the mark and then all

kinds of surmises are in order to find where the difference comes in. In the cases of the two mills cited, the whole cost of the labor is taken into consideration with the result that the actual cost for finishing a yard of cloth is positively known, and extending over a period of six months it is safe to assume that the same results can be duplicated and the labor cost be kept inside the limits thus set.

This, then, is the only true way for arriving at the true labor cost for finishing a yard of cloth. As stated in the beginning of this article, the whole question of the labor cost of finishing a yard of woolen cloth is more a question of management than any other. Instead of continually harping upon the theme of labor cost and the way to keep it down, as some firms do, even to the extent of squeezing the pay of the help down to the lowest limits, it would be much more to the point and bring much better results if this energy were expended in the direction of management.

That a department of the mill cannot be successfully managed from the office with a figurehead for boss, has been proven times without number, yet the very mills who clamor most about the labor cost and the necessity of reducing it, are generally found to be in the column of those who manage the details of departments in the office. If a figurehead is put in for boss without much authority the chances are largely that ability is also lacking, and if ability is lacking in an overseer, no one will find it out quicker than the man who is working under him. As soon as the help become convinced of the fact that the overseer is lacking in ability, the days of his usefulness for that firm are past and the department would be much better off without him. For an overseer to run a room economically he must have not only ability but also authority. If, however, the authority remains vested in the office it is seldom that the ability will assert itself, for a figurehead cares very little how things run so long as the pay is coming his way.

There is no imagination about this; it is a hard fact which cannot be argued away. There is no incentive for a man to show his ability in such places for in nine cases out of every ten, if a capable man manages to produce fair results, the office will claim all the credit, with the result that the man will soon tire of his exertions and let things go by the board. And this is just as it should be, for such concerns deserve no better. The only pity is that these things will not teach them a lesson. They simply go to the wall, but still believe in their own mind that what they don't know about running a mill and all departments in it is not worth knowing.

It remains a fact that our cousins across the great salt pond arrived long since at a much more satisfactory way of doing things. There the first question to be answered is the quality of the finish and every energy is bent upon the best results to be obtained in this direction. Having arrived at the desired result, which is perfection, the question of producing this result at the lowest possible cost is considered.

These things are done differently here and one might almost feel tempted to say they are done entirely in the opposite way, for here the main question seems to be, At how low a cost can these goods be produced? When that problem has been solved to the satisfaction of the powers that be, the energies are turned in the direction of improving the finish so long as that can be done without going beyond the limits of cost as prescribed.

It is for this reason that much of the management of departments, especially that of finishing, is sadly out of tune. Give a man of ability a chance of producing certain results and he will produce them, but do not limit him as to the labor cost. On the other hand if the results, that is the finish, are satisfactory, then it is time to think of producing such finish at the lowest possible cost. Much may be written upon this subject and still come no nearer a solution of the question of the labor cost of finishing woolen goods, but the foregoing gives a faint idea of what it is to figure on such cost.

Of the sixty-five textile items in the Japanese tariff list, the rate on fifty-one is expressed by the English yard.

The total annual crop of cotton from Egyptian plantations amounts to 850,000 to 875,000 bales.

LOW GRADE WOOLENS.

BY "DELAINE."

IV.

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The waste alone which is produced in an American woolen factory would be a fortune to a Yorkshire carding master. Hustling is tabooed, and the rule of procedure is quality the first and quantity of work the second consideration. It pays better to turn out half the quantity rather than spoil the work. But there are no half measures here when the machines are in good order. The card-wire is carefully nursed into perfect condition, when the machines are sped up to their capacity of output in accord with good work. The better the carding the better the finish of the woven cloth. The scribbler, or breaker, with two main cylinders of 52 inches diameter, and one breast cylinder of 30 inches, which has long prevailed in the Huddersfield district, has not sufficient carding power for low grade woolens produced in Leeds and the neighboring towns. Those who possessed two cylinder machines have enlarged them by a third cylinder, and have found both the quality and quantity of their work improved.

Recently I saw in the Caridigan Mill two new sets of machines, the scribblers of which had four cylinders, and running at the speed of 104 revolutions per minute. They were engaged upon a low grade weft and the output was 42 lbs. per hour.

Such high speed, however, is not advisable where there is much cotton in the blend, and a speed of 70 revolutions will then produce better carding.

Again, the high speed of the cylinders which is permissible when carding merino qualities of material, is too great for the open fibres of cheviot qualities, and a change of driving pulleys should be available. The machines have a width of 72 inches on the card-wire, and a speed of 70 revolutions per minute is found ample for the coarse qualities.

If the second or condensing machine of a set be run at a higher speed than 70 revolutions of the cylinders, the current of air draws the fibres from the sides to the centre of the card wire, and the side threads for the spinning mule are made too fine. The only cure for such irregularity in the thickness of the sliver is a reduction in the speed of the cylinders. When such irregularity exists, an attentive manufacturer will cause his spinners to separate the small side threads, by placing in a separate basket the weft bobbins which are spun from the side threads. Those can be given to one weaver, when only one piece will be faulty in place of many. Again, if the faulty weft be woven in box looms with two shuttles, two picks from each bobbin alternately, the fault is minimized. The best manufacturers in England follow that course and employ two shuttles both for plain goods and stripes. In the case of stripes it is a necessity. When woven with one shuttle striped goods often show shady marks across the piece. This important point has been named by the writer, somewhat out of the order first intended, in order to show its beginning and ending. It starts at the carding machines, but does not show itself, as a rule, till the woven cloth is found to be faulty.

In the carding department of woolen manufacture the treatment varies so much in accord with the material that fixed rules for all classes cannot be given. Wool is elastic and also variable in length and strength of fibre. Such facts cannot be ignored when the wool in its second manufacture has been reduced from rags to shoddy. Experienced carding masters recognize the difference in the fibres, which is plainly seen when one is dealing with fine, medium, or coarse material. The open fibres require but little carding, but pass rapidly through the machines. The feed and the doffer cylinders are then speeded up and the output increases; in some cases one or two of the workers are lifted clear—say from a quarter to half an inch—from the wire of each cylinder, to avoid reducing the strength of the tender material.

With wool of fine merino quality and shoddy or mungo, which is neppy, the carding is more difficult; the doffers are then slowed down and the rollers brought as close as possible without touching. A good rule is to set the wire close for fine work, and open when

dealing with coarse fibres, especially when both have to be put through one set of machines.

Rigid rules are impossible in carding wool fibres, since the material varies so much in length, strength and quality. Much depends upon the skill of the master carder as to the quantity of yarn and waste producible from a blend or mix. In Yorkshire low grade blends will not yield more than 75 per cent. of weft, and the yield sometimes drops to 60 per cent. at the hands of inferior carding masters. The proprietor's success, or ruin, often depends upon the ability of his carding master, so small is the margin of profit in many cases.

The intermediate feed, from the scribbler to the carder, is an important one, and for shoddy the blanket feed, known here as the Blamires feed, answer the best for shoddy. But for pure wool it is useless owing to the amount of electricity in the wool fibres. For that reason I recommend the Scotch feed as the best for all classes from wool to shoddy.

MEMOIRS OF A VETERAN MASTER MECHANIC.

BY EBEN GOULD

HOW TO KEEP STEAM UP.

The cost of fuel for textile mills depends in large measure upon the method of firing the boilers. Every mill manager knows by experience the difference between firemen in the amount of coal used for doing the same amount of work. Now the general principles of firing are the same for all kinds of steam boilers, whether used for heating or power, in a mill or dwelling house. To textile manufacturers the object is one of great importance, and an experience I once had while living in Hyde Park, Mass., shows how boilers should be fired in a textile mill, although it was in connection with a very different institution, a church.

The janitor who took care of the building and attended the fires was a young man from Maine. As I was acquainted with him I had often been with him to the basement to see the fires and how the building was heated. As the winter weather came on I noticed that the house was not sufficiently heated and on cold Sundays the audience was very small. Along in December the janitor and directors decided that another furnace was needed and that the coal supply was not sufficient to carry them through the winter. Now I knew by the way the fires were tended and the coal fed into the fire box that much more coal was being used than was necessary to keep such a building comfortably warm, but as I was not in a position where I felt that I had a right to interfere, I kept quiet.

The janitor knew I was a fireman, but he never spoke to me about the best way to run furnaces. A few days before Christmas he came to me and said he wanted to go home to see his father and mother over the holidays, and asked if I would take his place at the church while he was gone. I told him I would, and he wanted me to come that night and see how he fixed the fires so that I would be all right when left alone. I saw him throw on the coal till the fire-pots were full and then he heaped them up as long as he could keep the coal from falling on the floor. This was on a Friday night and he said it was necessary to start the fires then and keep them going till Sunday to have the church warm, and if the weather was very cold it would not be warm enough even then.

The next week he went away for two weeks. I did not start the fires on Friday as I was told to do, but Saturday just at night, I went to the church and began dusting the woodwork about the auditorium. In a little while one of the business managers came in and said:

"Will you be able to get the house warm tomorrow?"

"I think I shall," I replied.

"Well," he says, "it don't seem to be warm now."

"No," I says, "the fires are not started yet, but the kindling is all ready to light when it is time to kindle the fires."

Well, you ought to have seen that man. You would have thought he was trying to fly all to pieces, he was so excited, and he says:

"They should have been started Friday noon. Start them at once."

"Mr. Thompson," I says, "if I am to do the janitor's work I shall take my own way to

do it. I shall not start the fires until about four o'clock tomorrow morning and then I shall have all the doors and windows open for half an hour to let in fresh air, for the air that has been shut in here for a week will not warm up very well. Now, Mr. Thompson, you go home and get a good night's sleep and if you find your house cold in the morning you just come here to the church and get warmed up."

He went away muttering about not being able to hold any services the next day and I went home a little while after.

About four o'clock Sunday I started what fires I wanted, then opened all the doors and windows and let the cold, fresh air blow through. When the hot air began to come in through the radiators I closed the doors and windows and by eight o'clock the rooms were plenty warm enough, though it was the coldest Sunday we had had that winter.

A little after eight Mr. Thompson came blustering in, looked about as if astonished, and said:

"I never saw this house so warm on a cold day. When did you start the fires?"

"At four this morning."

Then he went to the radiator, held his hand to it and remarked:

"I never saw the air come in so hot. How did you do it?"

"My way of firing."

We then went to the furnace and he opened the door.

"How's this, the fire-pot is only half full. The other fellow used to keep it heaping full."

"What fire there is, is hot, isn't it?"

"Yes."

"Well," I said, "heat wants room according to its strength. Fill that pot with coal and there is no room for heat."

"Well, how are the other furnaces?"

"Come and see."

We then went to the back basement. He opened the door of the furnace and found it just the same,—only a little coal but red hot. Then he went to the third furnace and opened the door:

"How's this? There's no fire in this furnace."

"No," I replied, "two furnaces are plenty to warm such a building as this is, and instead of buying another furnace you can sell one if you want to."

"How much more coal shall we want, do you think?"

"Not any. You have coal enough to last a year if you run the fires right."

"Is that so? Why, we've been planning where we could put coal enough to last through the winter."

Well, the janitor was gone over a month instead of two weeks. I did not know he had come back until one day I saw him coming into the shop where I worked. All the time he had been gone the weather had been very cold, but I never started the third furnace. He came up and said he had been gone much longer than he expected when he went away, and since he had come back he had heard how warm I kept the church and he wanted me to keep on with it for he knew it wasn't in him to do as well as I had done.

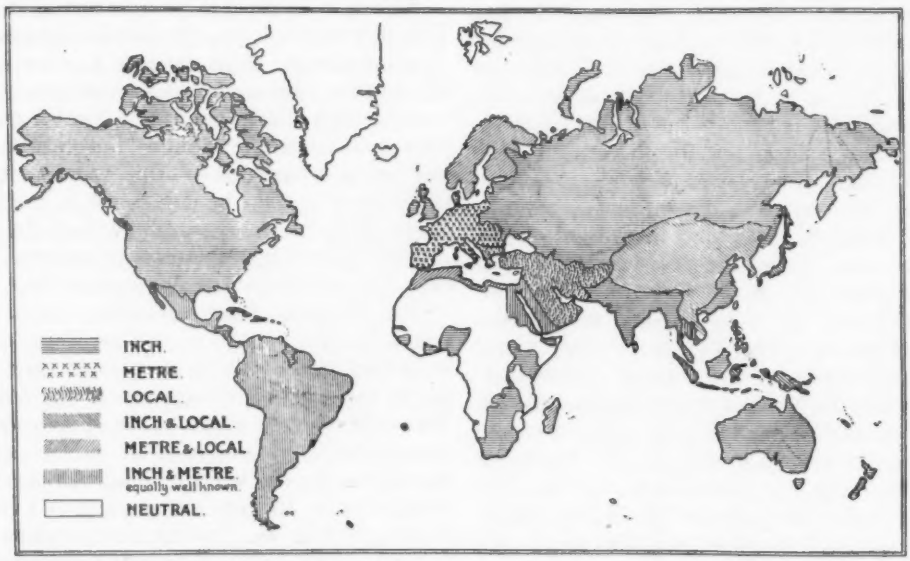
I kept the church as long as I stayed in Hyde Park. It soon got noised about that the church was well warmed and then the pews began to fill up. At one of the business meetings the minister made the remark that it was fully as important for a church to have a good janitor as to have a good minister.

Labor Laws in French Mills.

France is abreast if not in advance of all other countries in respect to legislation for regulating employment in factories, especially in regulating the employment of women and children. The execution of the laws, however, meets with considerable opposition from both employer and employee, and the inspectors of French mills and factories have had a hard road to travel; so hard, in fact, that the Minister of Commerce who is in charge of the inspectors, has asked the Minister of War to assign a force of gendarmes to assist the inspectors. The inspectors claim that when beginning the inspection of a mill the help who may be illegally employed there disappear as if by magic, leaving the premises by secret passages or over back fences, and that it is utterly impossible for the few inspectors to cover the mill quickly enough to detect the violation of the labor laws. Hence the call to arms.

THE INCH AND THE METRE.

[The following comparison of the areas of inch and metre-using countries is from a recent circular issued by the British Weights and Measures Association, 25 Victoria St., London. The metric agitation which, happily, ended in this country with the defeat of the proposed compulsory legislation is now at its height in Great Britain. Our readers cannot fail to observe that the Continental confusion of textile weights and measures, the exposure of which proved fatal to the metric cause in the United States, is now being used to the same desirable end on the other side of the water. Ed.]



Comparing the area of the inch-using and metre-using countries of the world, the former overwhelmingly predominates. In connection with that large part controlled by the English-speaking race, it is of the greatest importance to remember that its measures are identical for manufacturing and for commercial purposes, and that the English yard, as used in San Francisco, is identical with the yard used in Sydney, and the English pound used in Toronto is identical with that used in the Transvaal. Throughout the race there is only one standard of length used—the yard, and one standard of weight—the pound, and these are the standards which have been in use, at least, since the time of the Magna Charta, which declared there should only be "one weight and one measure throughout the realm." They are the standards on which our world-wide manufacturing pre-eminence is based; the standards which we are now asked to throw into the melting-pot and replace with metric measures which no single country in the world has adopted of its own free will; and in no single country has it been possible to dragoon the people into using the metric measures uniformly for manufacturing and for trade.

While we have indicated the greater part of the European continent as metre-using, we are not aware of any one country on that continent but what also uses measures and weights either identical with or of a similar character to, the English inch, foot, and pound. Such measures are their old local measures, and are used largely today in French factories, German machine shops, and Danish dairies. Take the case of Holland as a typical example. The metric system was introduced here 90 years ago, but still they use the Amsterdam, Friesland, and Rhineland feet, and have added to them metres and half-metres and English feet, the latter now predominating over all others combined. Then take the testimony of a French textile manufacturer, himself a metricite, who, writing to the French press, says: "We are as much in the anarchy of weights and measures for the textile industry as at the time of the Revolution. After having established the metric system, is it not truly ridi-

culous that, more than 110 years later we should still be using the English yard, the old French pound, the denier of Montpellier or of Milan, and the ancient aune? Note also, that while I speak here only of France, I could say as much of all Europe." Further, take the latest Austrian work (published in 1905) on textile calculations. The author begins by stating: "The English system of numbering is made the basis for the work, the French and metric systems being included only for purposes of comparison." In the rules given for calculations we find the warp calculated by the Vienna inch, the weft by the centimetre, and the weight by the English pound. The length of the cloth is in metres, the weight of it in English pounds, and the width of it in Paris inches! In a German publication, also of recent date, the rules provide for the reeds being gauged by the French line; the counts by 840 English yards, and the picks by the French line. The warp is calculated in metric grammes by the English hank, and extended at a price in German marks per English pound. The weft is calculated per 100 metres of cloth, from picks per French inch; width in French lines, and weight in metric grammes, finally being priced in German marks per English pound. But this must be simple compared with the metric system, for a proposition in the German Reichstag in the autumn of 1902 to introduce that system was defeated on the grounds that it would throw the German textile industry into "ungodly disorder." Spanish and Italian textile handbooks all tell the same tale.

A close study of the whole subject of weights and measures elucidates the fact that in no country where the metre and its derivatives have been thrust on the people have such measures made their way on their merits. The only effect has been to make confusion worse confounded.

By a vote of the members, eleven manufacturing associations in the United States and one in Canada have declared against the adoption of the metric system in the respective countries.

ENGLISH NOTES.

(By our Special Correspondent.)

Wool values remain distinctly uncomfortable; spinners of botany yarns are shorter of profit than of work. Their margin is of the smallest though perhaps it is rising. Crossbred spinning is flat and nobody can say confidently that demand is about to increase. In short, Bradford may be driven, but will scarcely be led into maintaining the established levels of prices.

Retailers of apparel for men are agreed in thinking the time ripe for greater indulgence in color effects. Men are said to be tired of the sombre and modest hues that for a year or two have been dominant. The wish perhaps is father to the thought, but in so far as fashion is international, American manufacturers may perhaps be influenced by the hint. More than suitings are involved in the change. Vestings, shirtings, tie-cloths and even hats and collars are concerned.

The Canadian Commercial Agent for the Leeds district describes the prospects of a reduction of the 30 per cent. tariff on dress goods and worsted linings as very favorable. The suggestion is made by Bradford people that 23 per cent. ought to be enough upon classes of goods which Canadians do not manufacture to any noteworthy extent. Hence Mr. J. B. Jackson's expression of opinion. The same authority in reporting to his department exhorts Canadians to import from Yorkshire managers who are graduates of the textile schools. The school diplomas have their value, but perhaps most of our eminently successful managers are not possessors of them, and though the schools are of genuine good to the right men they can do little to remedy the more serious defects in a manager's make-up.

It is symptomatic of Lancashire's prosperity to be able to say that some 300,000 weavers, winders and warpers are to receive 5 per cent. advance in wages and that a proposed advance of 2 1/2 per cent. further is to be considered in January, 1906. The full 7 1/2 per cent. demanded means 40 to 50 cents per head per week, or towards $7,000,000 per annum. Some 46,000,000 cotton

spindles and 652,000 looms are in operation; in other words about 777,000 spindles more than last year. Meantime a keen demand is noted for good second-hand looms, which have fetched in some instances actually more money than the price of new looms bought a few months ago. Weaving trade improves more rapidly than any comparative statistics show. Spinning companies continue to be formed with somewhat dangerous frequency and the statement has been made, with some show of authority, that the textile machinists have unanimously agreed to take no more stock in new mills. Machinists and building firms are said to hold shares for $2,500,000 in the mills now under construction and their aid was counted on for projects still in contemplation.

An event which may acquire historical interest in years to come is the sale in London of the first consignment of wool from Rhodesia. Seven bales were sold at the March sales and the price realized was 7 1/4 pence per pound. Settlers in the Gazaland or Melsetter territory are persuaded that sheep raising is to be the staple industry of that favored part of British Central Africa. Fine sweet grass grows even in the rainless months of winter, aided by the dew-laden winds from the sea. One farmer has already 500 high grade merino ewes and a stud of pure Rambouillet rams and is preparing to extend operations. Others are developing in a smaller way. Co-operative selling of produce, in order to secure the best of the market is coming into favor among the agriculturalists.

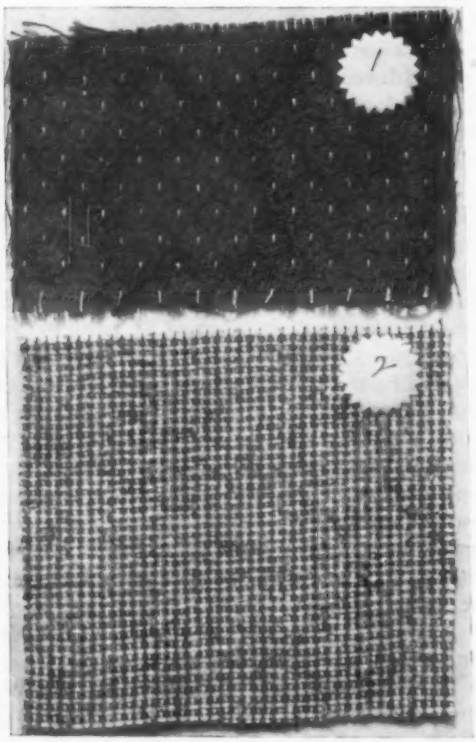
It should interest Southerners to know that would-be cotton planters in East Africa have already fouled the labor snag. Indentured labor from India or China is suggested as the only possible solution of the difficulty. Transport facilities are almost totally wanting. At least $3750 capital to begin a plantation would be required and arriving in August eighteen months must be spent in waiting for any returns. The natives have a prejudice against working more than two months in the year and a few thousand acres are all that could justifiably be cropped at present.

An interesting fact concerning American cottons may be rescued from the obscurity of an English Survey Report. On the confines of Abyssinia, in the Boran country "Americani" replaces cash. Drills and tobacco are all the natives need and they sell camels and bullocks preferably for cotton. As the dollars are base Austrians of the currency of a century and a half ago the cloth-standard is distinctly better than the silver basis. Merchants of Somali or Benadir origin bring up the pieces from Lugh or Bardera. Only the poorest natives will accept the softer, thicker and less durable cottons which are woven by hand in the Konso Province. The Central African heathen with camels to spend insists on "Americani."

According to a summary published, the German textile mills found 1904 slightly less profitable than 1903. Concerns capitalized at $21,500,000 and quoted on the Berlin Stock Exchange, earned an average dividend of 5.63 per cent. in 1902, 5.85 per cent. in 1903, and 5.36 per cent. in 1904, a decline of one-half per cent. The partial closing of certain export markets in early 1906 is thought to presage a violent increase in internal competition and a renewed anxiety to find fresh openings over sea. The woolen industry in particular has to fear a recurrence of the crisis of four years ago when large sums of money had to be raised to find current expenses for distressed mills.

English industrial development permits one to classify its manufacturers by districts with a fair accuracy. Particular places become associated with particular classes of goods and whether the area be a kingdom, a county, a town or a village, the generalization holds good until it reaches its smallest focus in some one mill. Silsden (Keighley) is a townlet in a valley with no large pretentions of any outward kind. But Silsden makes are special and peculiar. They are dress goods for home as well as for colonial sale, usually of flimsy construction, but invariably looking better than their cost. Cotton fancies is perhaps the nearest approximation to their description. Worsted, silk, tinsel or anything else decorative may be employed for a season in combination with the foundation of cotton. But with cotton alone the Silsden mills will produce fabrics

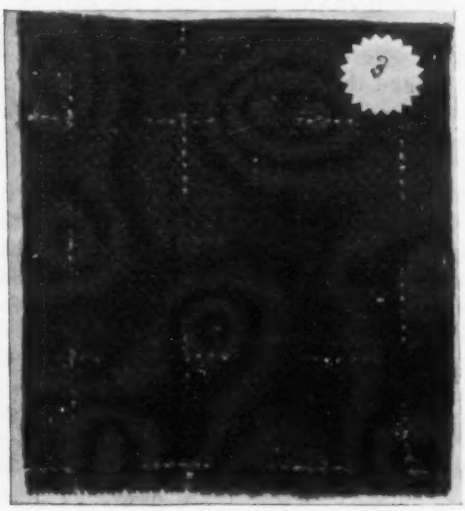
which belie their origin. There are, for example, the remarkable styles now being produced by the firm Berry & Fletcher, Fig. 1. The groundwork is a 4-leaf twill, with a broad, or a line stripe, or both. To this are added sister threads of thick black cotton in the warp at six end intervals which float for five picks and are sunk for five alternately. An extra filling of sister black threads is



thrown above the basic twill and tied by the sinkage of the black threads of the warp. Thus a honeycomb is formed on the face of the cloth and an immense improvement in its feel of heaviness effected. Grounds of grey, green, blue, red and of contrasted warp and filling are employed and upon all of them the honeycomb lies as if it were a large mesh of black. The cost of the cloth in relation to its elaboration seems insignificant at 6 1/8d. (12 3/4 cents) per yard, 38 inches wide. It is woven on rapid, Bradford-made looms and the style has been taken up well by merchants who are quick to recognize merit in cheap stuffs. A feature of the fabric is that it depends for success simply on the weaving of yarns that any cotton spinner can spin and that any manufacturer can buy.

A useful type of costume cloth at 17 1/2 cents, 41 inch wide, is of Guiseley origin, prepared by makers of light woolens. A sample is seen at Fig. 2. A filling of alternate light and dark angola yarn is woven plain on a finer warp of white angola and cotton yarn in a bright shade. The dark picks thus appear as square dots on a light ground. A line stripe is carried behind to appear as a float over five picks at 12-pick intervals and so to vary the monotony. The idea is capable of performance in fabrics of many weights and many low materials.

Germans in Muhlhausen are selling for our winter trade clean and bright dress tweeds at remarkably low prices. The good color and



the realistic all-wool air of articles, by no means free from cotton and shoddy, accounts for the success of Binckebanck & Hammer's goods in this market. At similar prices most English goods look considerably less like expensive goods. One style is shown at Fig. 3.

The newest sewing machine has no shuttle. It sews from two reels, one at the usual place at the head of the machine and one beneath the footplate and immediately below the feed. Dennis Flanagan of Clayton-le-Moors, Accrington (Eng.) is the inventor. Reduced cost of machines and less complicated mechanism are advantages claimed.

A FULLING MILL STOP MOTION.

The stop motion for fulling mills shown in the accompanying illustration has recently been patented in this country. The inventor describes it as follows:

In fulling machines as at present constructed the stop motion is operated by the knots or other obstructions in the cloth engaging the bars of the separating rack, the movement of the bar-frame caused by the knots coming in contact with the bars being transmitted by a suitable series of connections to disengage the clutch which secures the driving pulley to the shaft. It frequently happens that the smaller knots pass loosely between the bars and fail to operate the bar-frame. This difficulty is overcome in the new device by causing the cloth to pass between two bars, the upper one being loose so that when a knot or kink in the cloth passes between the bars it forces the upper away from the lower; this motion is transmitted through a series of connections to the clutch to disengage it.

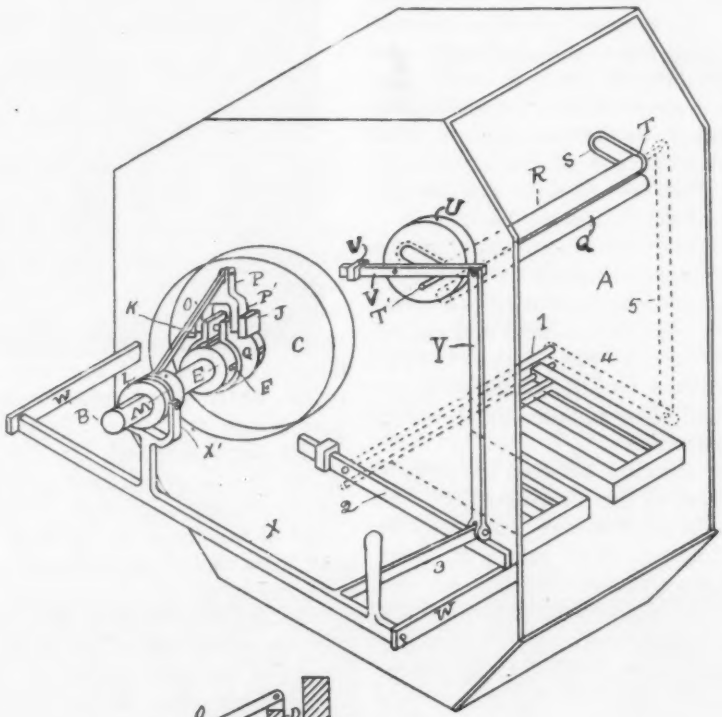


Fig. 1.

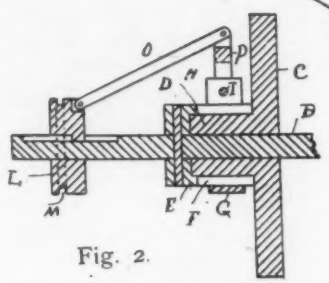


Fig. 2.

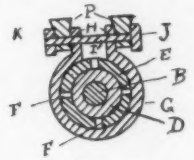


Fig. 3.

Fig. 1 is a perspective view of the fulling machine with the stop motion attached, the end being shown open to expose a part of the interior structure of the machine. Fig. 2 is a longitudinal sectional view through the pulley, clutch, and clutch-operating levers; and Fig. 3 is a transverse sectional view taken through the clutch.

A driving shaft, B, having loosely mounted

thereon a driving pulley, C, is provided with a projecting hub, D. Secured to the shaft and in frictional engagement with the hub is a sleeve, E, provided with one or more slits, F. Around the friction-sleeve passes a tightening band, G, with upwardly extending ears, H, through which passes a bolt, I, provided with a head, J, at one end and a nut, K, at the other end. Splined on the shaft is a sliding disk, L, having a circumferential groove, M. Attached to this disk is the end of one member, O, of a toggle-lever. The end of the other member, P, is bifurcated and pivotally mounted one fork between the head of the bolt and one ear of the tightening-band and the other fork between the nut and the other ear of the tightening band.

In cross-section the forked ends of the member, P, are wedge-shaped, as seen at P', Fig. 3. An upward movement of the member, P, tightens the friction-band and causes the shaft to rotate with the pulley. The return down movement of the member, P, releases the clutch. Any suitable clutch movement may be substituted.

Two bars are mounted between the sides of the frame in front of the drawing-rolls. The lower, Q, should be stationary, but may be rotatable, if desired. The other, R, rests loosely upon the former and has its end loosely mounted in sockets, S, in the sides of the frame. For convenience and freedom of movement the ends of the bar are rounded, as seen at T, and inserted in the ends are small pins, T', which project through a slotted plate, U, secured to the sides, the slots in said plate registering with the larger slots in the sides of the frame.

On the outside of that side of the frame on which the driving-pulley is mounted is a pivoted lever, V, extending across the path of the projecting pin of the movable bar. Lever, V, may have a sliding counterbalance-weight, V'. Pivotally mounted on brackets, W, secured to the frame, is an angle-lever, X, one arm of the angle-lever being pivotally connected with the lever, V, by means of a link, Y, and the other arm of said lever being provided with a bifurcated arm, X', at right angles thereto and having its ends adapted to take into groove, M, in the sliding disk, L, on the driving-shaft. When a knot in the cloth reaches the bars, R and Q, it immediately causes the upper bar to rise, lifting the end of lever, V, and transmitting a similar movement, through the connecting link, Y, to the angle-lever, throwing the sliding sleeve outwardly on the shaft and releasing the tightening band and friction sleeve, stopping the machine.

LINEN FIRE HOSE.

BY BENJAMIN RICHARDS, Boston, Mass.

The manufacture of linen fire hose is a branch of textile industry which, in recent years, has become of considerable importance as the increased use of private fire fighting appliances has created a steady demand for the hose and apparently there will be a large increase in its use in the near future. A visitor to modern office buildings, hotels, theatres, factories and steamboats will find linen hose connected, in convenient locations, to the water supply pipes ready for use, in case of fire, at a moment's notice.

The large demand for this hose is due mostly to the requirements of the insurance companies, although many owners and occupants of buildings, recognizing its value, install it on their own initiative, to obtain protection and safety.

The large part of the linen hose sold in this country is made by American manufacturers. The imports of hose, "made wholly or in part of flax," for the year ending June 30, 1903, amounted to but 3,500 pounds, valued at $2,318. The following year the amount imported fell to 1,867 pounds, valued at $1,152. The duty averages 30 to 32 per cent. ad valorem for the two years.

Some of the hose manufacturers import their yarns, twisting them together and weaving the hose in their own shops. There is a duty of 40 per cent. on flax yarns of the counts used in hose, but, notwithstanding this, there was a considerable increase in the amount of such yarns imported during 1904 over that of the previous year. The question of spinning these yarns in American mills deserves the careful attention of our manufacturers.

Fig. 1 shows a group of samples cut from the best brands on the market today.

Most of the linen hose is woven on flat looms, although some of it is being produced successfully on circular looms, similar to

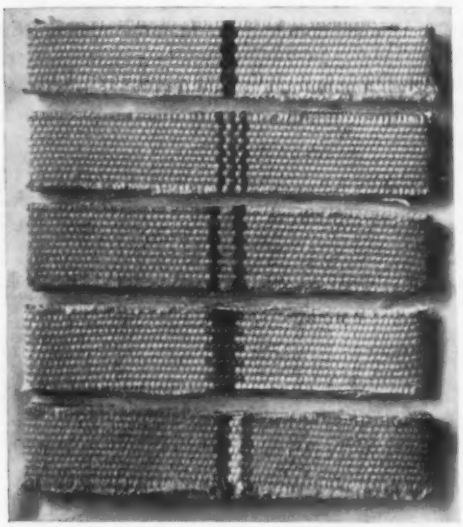


FIG. 1.

those used for the manufacture of the cotton jackets for rubber lined hose. The machines are all of special patterns and have been developed from years of experience by the several manufacturers, who usually guard them carefully from inspection by outsiders. Linen hose must be woven with a high tension on the warp and the filling must be closely beaten up, otherwise the hose will not be tight when under water pressure. If a flat loom is used, much care and skill are required to get the edges firm and even; the poorer grades generally leak badly along these edges. The hose made on the circular loom if not well woven will be loose, as the machine requires careful adjustment of the tension upon the warp and filling.

Linen hose is made today in many sizes and weights. The sizes run from three-quarters of an inch to three inches in diameter, while the weight of the 2 1/2-inch hose (which size is in most general use) has been found to vary from seven to twenty-five pounds per 100 feet among different brands.

A good reliable 2 1/2-inch hose should be made entirely of yarns spun from the best quality of linen flax. It is needless to say that tow or cotton is not fit for use in unlined hose. The hose of the better grades weighs something over twenty pounds per 100 feet of fabric and has a 3- or 4-ply warp yarn, the single yarns counting from 14 to 24 lea. There are 500 to 600 ends in the warp, two ends being usually run together. This is equivalent to 60 to 70 ends per inch in the fabric. The "tightness" of the hose is improved by the running of two warp ends together and this also makes the warp lay flat, giving a smooth, even fabric and reduc-

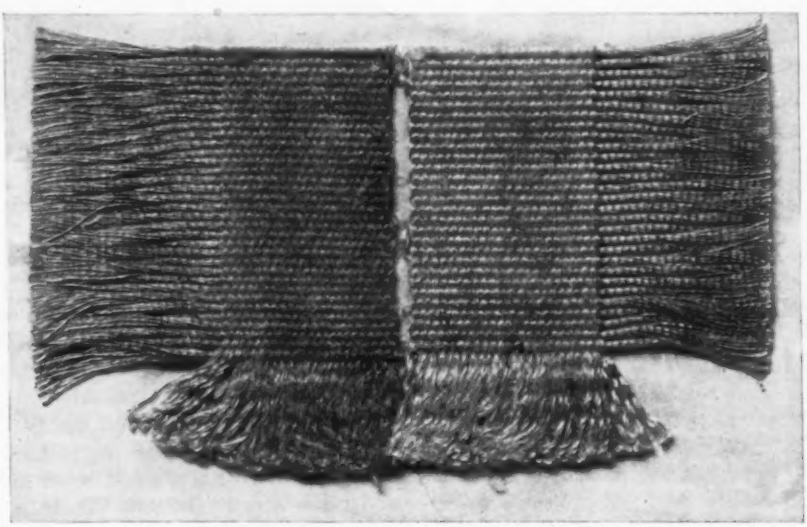


FIG. 2.

ing to a minimum the possibility of abrasion. The filling of the best hose is 15-ply, the single yarns being usually somewhat finer than those of the warp. There are generally not less than thirteen picks of filling per inch. The filling forms a continuous series of rings about the hose. Fig. 2 shows pieces of the hose fabric partially unraveled exposing the filling, from which a good idea of the construction may be obtained.

The warp should be tightly woven over the filling, covering the latter so that it is entirely protected.

The strength of the hose is largely due to the filling and this arrangement prevents the filling from becoming injured with a consequent reduction of strength in the hose. By using fine yarns in making up the ply-yarns the finished hose will be more uniform and present a better appearance.

Only such twist should be used in the yarns as is necessary for strength as hard twisted yarns will absorb the water less readily when the hose is wet and thus will not swell up and make the fabric water tight. Good, new hose becomes practically water tight after having been wet a few minutes and should be able to withstand a pressure of 500 pounds per square inch without bursting.

As all flax contains a considerable percentage of pectic substances which should be cleansed from the fibres, it is important that the yarns be properly degummed by a long continued alkali boil. This should be done before the yarns are twisted into the ply yarns as used in the hose. Hose made from yarns which have not been properly boiled is likely to deteriorate rapidly, as the gum in the yarns causes mildew or fermentation when the hose becomes damp. The result of decay from insufficient boiling of the yarns is shown in Fig. 3. Both the warp and filling of this sample were weakened so that the hose burst as shown and leaked excessively when put under pressure.

The presence of unboiled yarns in the hose also prevents the fibres from swelling when wet, which quality is necessary for a hose that is to be water tight when under pressure. The spinner should run the yarns heavier than called for by the hose manufacturer in order that they may not be under weight when properly boiled and finished.

After boiling, the alkali should be thoroughly washed out of the yarns and if acid is used to neutralize the alkali this also must be washed out, for if either of these substances remains in the hose its strength would be reduced.

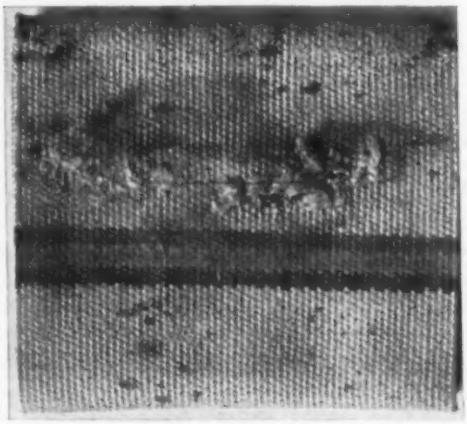


FIG. 3.

Bleached or partially bleached yarns make a good looking hose and, unfortunately, promote its sale, but bleaching to any extent is an injury to the hose and reduces its reliability for fire service. The color of a hose does not aid in estimating its quality.

Linen hose often bursts along the "color line" which is inserted by the maker as a trade-mark. These color lines are made of dyed warp yarns and the use of poor dyestuffs is often the cause of weakness at this point.

The quality of the hose, therefore, depends much upon the spinner of the yarn; the amount of skill he shows in his work will directly affect the value of the hose in saving life and property. Of course the hose manufacturer who uses high-priced yarns will lose a few sales to the man that wants some hose "for the insurance inspector to look at," but when that man has a good brisk fire to fight and takes down his "show" hose in the hope of saving his goods, he is very likely to learn a lesson which will make him a good customer ever after for the manufacturer who has real fire hose to sell.

There is often a misunderstanding regarding the proper use of linen fire hose. It is easily worn out if drawn over rough concrete or pavements, and easily cut by scrap iron or a sharp stone. The maker of the hose cannot be blamed if the hose bursts after such usage. For ordinary out-door fire service the cotton rubber lined hose is unquestionably the best, providing it is well made and contains a lining of real rubber. If well cared for and kept in a cool place the rubber lined hose will out-last the linen hose. It also has the advantage of not leaking while under pressure. Linen hose is the best for service in buildings where short lengths can be attached to the water pipes within easy reach and folded or reeled up into a small space, ready for use. The cotton rubber lined hose is too bulky for such locations and moreover will deteriorate if kept in warm rooms.

The smaller sizes of linen hose are used to

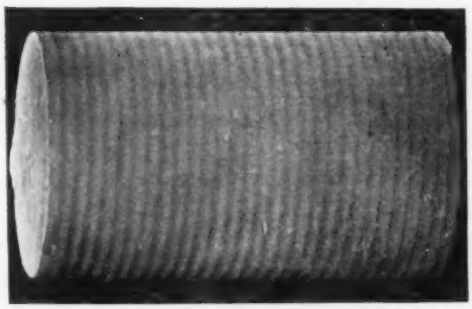


FIG. 4.

a considerable extent in factories for the protection of specially hazardous machines or processes. The best equipped mule rooms usually are provided with one or more lengths of small hose between each pair of mules, and there is hardly a picker room which is not provided with a good supply.

When first wet, linen hose leaks or "sweats" slightly through the woven fabric, a puddle of water usually collecting beneath it, but after a few minutes as the flax absorbs the water, the yarns swell until the hose is practically tight. As linen hose possesses this quality of becoming water-tight it is not necessary to insert a rubber lining. Having no lining the hose is rough inside, which accounts for its reduced capacity for delivering water without excessive loss of pressure. Long lines of linen hose do not provide satisfactory fire streams as the pressure is used up in forcing the water through the rough interior before it reaches the nozzle. The reason for this can be readily seen in Fig. 4, which shows a plaster cast of the interior of the hose made while it was under pressure.

A good, reliable 2 1/2-inch linen hose can be purchased from manufacturers of repute for 25 to 30 cents per foot, including couplings. At this low price it is hardly worth while to risk valuable furnishings or machinery for the sake of saving three or four cents a foot.

It is an easy matter for the purchaser to satisfy himself that he is getting reliable goods if he cares to make a short examination and test of the hose as follows:

1. Weight. The hose should weigh about 15 pounds, including the couplings, per 50-foot length.

2. Leakage. Lay the hose in a trough or on a board, plug one end and turn on the water from a hydrant and note whether the hose becomes practically tight after a few minutes. A bucket can be placed under one end of the trough if desired and the amount of leakage measured.

3. Strength. Turn on the full pressure available from a hydrant or pump and note whether the hose and couplings are sufficiently strong. The hose usually bursts by breaking the filling.

A manufacturer of linen fire hose would do well to give strict attention to the following points:

1. Make only the best. Do not make cheap hose, for show. Hose that proves reliable at the fire is the best seller in the end.

2. Get the best yarns obtainable. These often deteriorate years after the hose has left the weave shop of the manufacturer, and their ghosts rise from seeming obscurity to point a finger of scorn at his reputation.

3. Test your hose for leakage and strength occasionally and thus prevent the other fellow from telling you things about your own hose.

4. Put in your trade-mark and stamp on every length your name and the year of manufacture, and be prepared to stand back of all hose so marked.

Questions and Answers.

Under this head we undertake to answer, free of charge, to the best of our ability, any pertinent inquiry pertaining to textile matters received from any regular subscriber to the TEXTILE WORLD RECORD. Questions should be stated as briefly and concisely as possible. Inquiries pertaining to textile processes, machinery, improvements, methods of management, the markets, etc., are especially invited, as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith.

For reply to questions that are not of general interest to readers of textile journals, such as those relating to the composition of yarns, analysis of fabrics, etc., we will charge the enquirer with the cost of the investigation.

Growth of the Textile Industry.

Editor Textile World Record:

Please publish some statistics showing the growth of the different branches of textile manufacturing in the United States during the last two or three decades. Cumberland (521).

The best basis for indicating the growth of an industry is the total amount of wages paid. The following statement, taken from the U. S. census, shows the wages paid in different branches of the textile industry during the last year of each of the last five decades.

	1860.	1870.	1880.	1890.	1900.
Cotton	$23,940,108	$39,044,132	$42,040,510	$66.024,538	$86,689,752
Wool	11,699,630	35,928,150	40,687,612	54,339,775	57.933,817
Silk	1,050.224	1,942,286	9,146,705	17,762,441	20,982,194
Knit goods	1,661.972	4,429,085	6,701,475	16,578,119	24,358,627
Flax, hemp, jute				4,872,389	6,331,741
Dyeing, finishing	2.001,528	5,221,538	6,474,364	8,911,720	12,726,316
	$40.353,462	$86,565,191	$105,050,666	$168,488,982	$209,022,447

The percentage of increase thus shown for each of the last four decades, ending with the years 1870, 1880, 1890 and 1900 respectively, is as follows:

	1870	1880	1890	1900
Cotton	63%	7%	57%	31%
Wool	207%	'3%	35%	6%
Silk	84%	371%	92%	16%
Knit goods	166%	51%	147%	46%
Flax, hemp and jute	....	....	....	32%
Dyeing, finishing	168%	23%	37%	42%
Average	114%	21%	60%	24%

The decline in the rate of increase to 21 per cent. for the decade ending with 1870, and to 24 per cent. for that ending with 1900 is at least partially due to the panic and succeeding business depression in each of these periods.

Making Cotton Batting.

Editor Textile World Record:

Please describe the process of making cotton batting for filling mattresses, cotton comforters, etc. Fuller (541.)

A description of this process was given in our February issue, and to this we are able now to add the following interesting account of Sam Driver's experience:

I have made many different qualities of batting, from picked cotton bagging mixed with a small per cent. of cotton shoddy run through a rag picker, to the very best grades. For soft-top mattresses, I have run all kinds of the very lowest stock to be bought in the market—old under-clothing, stockings, pants, coats, everything and anything. This was run through a rag picker and then through a duster. For making real cotton batting any width of card will do, provided you have the camel back feed and the doubling aprons attached to make the batts double. Any woolen first breaker will do if it is of the right width required for the batting. The drum is placed under the cone and the stock runs around. Of course the drum or cylinder must be of a certain diameter to make a certain length of batt, and the width of the card depends on the width of the batt. The cards should not be too narrow, but if they are wide they can be trimmed off to the right width. On the top of the drum that the stock runs on to make the batts, a cross bar with a bell attached is placed across the drum. A roller is placed on top of the drum with notches in the centre. When the batt is of the right thickness it raises this roller and rings the bell.

Calendering Cloth for Flour Bags.

Editor Textile World Record:

Referring to the previous replies in regard to a mixture for calendering, we will first repeat our original question:

"We have a five roll calender, three rolls heated by steam, and wish to finish ordinary plain cotton goods used for flour sacks. At present we are using a preparation consisting of boiled starch, lard oil, paraffine, and a little China clay, and while it gives a very fair finish it does not give the finish we desire. We want the goods to have a fine gloss, the nap to be laid down and the goods when finished to be rather stiff. Please tell us the proper mixture to put on the goods when calendering to bring about these results."

Judging from the replies received we were in error in not stating in the first place how we applied this mixture to the cloth. We have applied it directly with a White sprinkler, passing the roll of cloth while still damp directly to the calender, and the cloth was damp from the starch mixture,

not from a second sprinkling as recommended by your correspondents. We would like to know if this is the proper method of applying the starch mixture or should the cloth actually pass through the starch, and the starch be squeezed into the fabric by passing through the rolls? From the answers already given it would seem that we require a special machine to starch the goods and also one to dry them. Bangor (539).

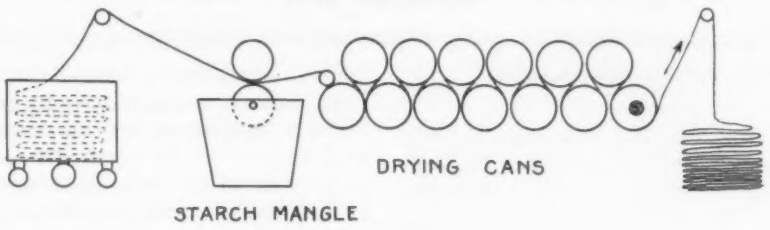


FIG. 1.

Bangor's method of applying the starch to the cloth is one I never heard of. All the finishers I know dry the goods before sprinkling and calendering, then sprinkle with only a fine mist of water. For light sizing the goods should be back starched and then passed directly to the cans for drying, Fig. 1. Some finishers then sprinkle the goods with a jet or a brush sprinkler and let them lay some little time before calendering, on the same principle that a laundress irons a shirt bosom. For heavy sizings the goods are passed into a starch mangle and the surplus starch is squeezed out between heavy bowls, one of rubber and one of brass, like Fig. 2. In this case also the goods can be run directly to the drying cylinders and dried, then sprinkled and calendered. Some finishers use a steam jet instead of a water sprinkler; in such cases it is placed on the calender and saves the extra labor of sprinkling. Where an extra fine gloss is wanted a paraffine bath is applied, using a heated hollow steel roll which keeps the paraffine melted. In this case there is only one roll used and the doctor is used to scrape off the extra paraffine, Fig. 3.

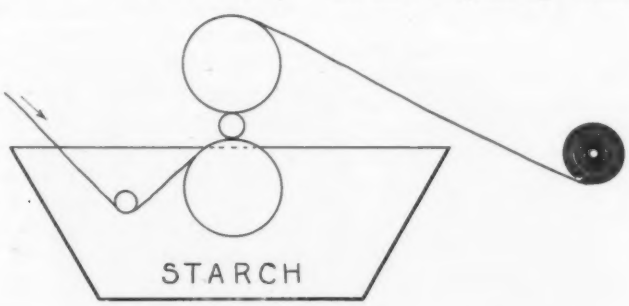


FIG. 2.

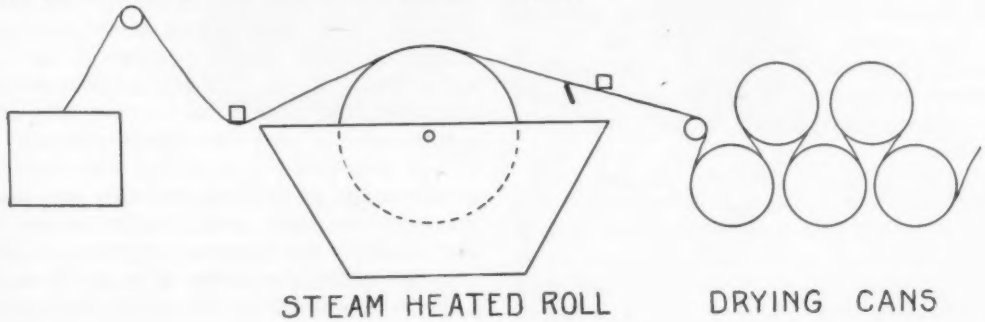


FIG. 3.

I think Bangor needs a starch mangle and either a set of drying cans or a tenter frame. The starch should be squeezed into the goods, but unless he wants to increase the weight of the goods considerably or needs a hand finish, the back starching shown at Fig. 1 will suit his purpose. Baumwolle.

KNITTING DEPARTMENT.

For Knitting Mill Machinery, Equipment and Supplies, see pages 232 to 253. Also Buyers' Index.

KNIT GOODS SITUATION.

At this writing the spring lines are in fairly good condition. The shortage that has existed in men's balbriggans is being gradually provided for, but at the same time it is a difficult matter to get quick delivery on scarcely any lines of summer underwear, unless it is ladies' very low price straight ribbed goods.

Lisles and mercerized goods are not at all plentiful and with a short term of warm weather will be scarce. It is now impossible to get duplicates on a great many styles of fancy trimmed numbers, owing to the patterns of lace trimmings being exhausted.

Men's ribbed goods have been in active demand more recently, probably due to the scarcity of balbriggans. Bleached goods both in plain and ribbed have sold largely and manufacturers are now behind on the deliveries of these lines.

Mesh goods for men in white and blue are being taken fairly well, although it is still early in the season to expect any great business on this class of merchandise.

Lace trimmed pants and also lace trimmed equestrienne tights have been taken largely and a great variety of dainty lace trimmings is being shown. We understand from some retailers that the lace trimmed knit pant is taking the place of the muslin pants to quite an extent, particularly in 25c. and 50c. grades.

There has been a moderate increase in the volume of business on heavy cotton and wool goods for the past three weeks, but just at the present time, buyers have stopped operating and it is expected they will now wait until their first purchases are delivered before making any further contracts, unless some radical change takes place in the raw material market.

Cotton yarns have stiffened up some and a number of manufacturers occupy a comparatively independent position in regard to orders. Yet, if any buyer is in the market now to place contracts, he can probably buy his merchandise as low as at any time this year.

An unusually large quantity of cheap fleeced goods is being delivered and if even a fair volume of duplicate business comes to hand this month, it is possible that buyers will be obliged to pay advance prices for June duplicates. It is certain that manufacturers have taken their initial orders at prices with little or no profit in sight and are not anxious to run the season through on the same basis.

The ladies' ribbed goods business does not differ largely from that of men's fleeces and advance prices are needed here also. There are those who predict dire results for the manufacturers who have sold up their mills on ladies' ribbed goods to weigh 8 lbs. at $1.90, and although they have all delivered their samples satisfactorily, so much has been said regarding this matter that some jobbers are beginning to wonder if the goods will be turned out as well as the samples, and are ordering forward small shipments now for the purpose of seeing how the goods run and some of the larger jobbers are taking their entire purchase of this class of goods, as fast as manufacturers can turn them out. We are told that some manufacturers sold their goods to weigh 8 lbs. on size 6 vests and have started to make deliveries; that the jobbers have found they are getting exactly what they bought, namely, 8 lbs. on size 6 for the vests, but that there is a wide range of weights of pants; and that the weights of sizes 4 and 5 are run down so that the buyer is not getting any more weight in a case of the goods than if he had bought 7 1/2 lb. goods with a reasonable difference in weight on the smaller sizes. We are told that some of these goods are being delivered and weigh about as follows:

	4	5	6
Vests	6 lb. 4 oz.	7 lb. 2 oz.	8 lb.
Parts	6 lb.	6 lb. 10 oz.	7 lb. 8 oz.

It is not surprising that the buyer receiving these goods is making a vigorous kick.

The attention of jobbers has recently been called again to a factor in the underwear business that threatens to make great inroads into their trade. We refer to the practice of certain manufacturers who, while they may be good producers, are not good distributers, and who are launching out into a method of distributing their production in a way fraught with danger to themselves, as well as to the jobber. These manufacturers took blanket orders for certain concerns who style themselves mill agents, but who sell the goods at a margin of from 5 to 7 1/2 per cent. and oftentimes less. When orders are received by these agents, they are forwarded to the manufacturer, who ships the goods direct, so that all that is necessary for them to do is to make out the invoices. Some of these manufacturers even go so far as to send the samples direct from the mill to a large number of retailers while the so-called mill agent addresses a circular letter to the retailer, thus doing away with traveling men's expenses. Legitimate jobbers who carry stocks and keep up expensive organizations cannot afford to sell merchandise on so close a margin and are, therefore, finding their business cut by this sort of arrangement. The indications are that this matter will be fought to a finish in the near future.

HOSIERY.

Fall hosiery business done by jobbers has improved considerably during the last two weeks and today it is believed to be larger than for any season in recent years. A few large mills report being sold up for the season and nearly all lines are well conditioned.

A scarcity exists in low priced fleece lined goods, and 2 1/2-lb., 176-needle goods recently quoted at 97 1/2c. are now being held at $1.00. In fact, it is an easy matter for manufacturers to sell lines that approximate in price and value those leading lines that are now becoming scarce.

BLACK SILK HOSE.

A careful observation of what is being taken at retail counters almost convinces one that lace goods are to be continued in favor for some time to come. Embroidered goods in small, neat designs are also taken freely, but the fact that these small patterns are being copied so extensively in low price seamless goods has caused the prediction that the trade will go to the large and more elaborate designs.

Gauzes are still popular, but the trade are

becoming educated to the fact that to be satisfactory, a gauze stocking must have a garter top and double soles. Jacquard patterns and the small embroidered effects in men's half hose have a large demand.

Julius Kayser & Co. are showing a novelty in silk hose, the feature of which is a double toe made of two thicknesses of the cloth instead of being spliced. Although this feature has been successful in their line of gloves, we scarcely believe that hose made in this way will be taken by the trade as readily.

We illustrate in this issue some silk hose made by the McCallum Hosiery Co. These goods are intended to retail at about $5.00 per pair and are made of pure black silk with butterflies in white tapestry embroidery, clusters of forget-me-nots and pansies, and some very handsome designs in black and white embroidery. This is a part of the hosiery business that the domestic manufacturers seem to have no difficulty in holding and indeed, it has come to pass that there is scarcely a style or price of hosiery wanted that cannot be as well or better supplied by domestic manufacturers as by German or French makers.

CHEMNITZ REPORT.

Large shipments of goods are still leaving town every week to fill back orders for spring. Besides the scarcity of goods from the mills, a scarcity of girls for the finishing rooms is now also felt, so that often goods are delayed for a week or two, simply because they cannot be finished. The morning papers contain advertisements every day for girls to board the goods, but as this is rather hard and trying work and there is plenty of easier work to be had, they do not respond to the required extent.

The leading buyers are coming again and find that a good share of the goods on their spring orders has not yet left town. They cannot cancel any of the orders either, as otherwise they do not get anything at all.

In lace hosiery the market is filling up fast for delivery way into next fall and buyers wanting any goods for delivery next December will do well not to delay their orders longer, but place them at once.

Regarding prices, there is no probability that they will go any lower, as yarns are again rising in price and wages will by no means go back. The demand for lace goods for European and Australian markets has grown to such an extent that even with the immensely increased production there will not be more goods in the market than are needed. If the American market takes them up again the same as this season, there will be even more trouble to get them on time than there is now.

Also in staple goods, fair orders are placed and now is the time to place orders for next spring, as some extra values are offered which may not be in the market long.

For fancies, embroidered styles will most likely be used again almost exclusively, with the exception of some jacquard numbers which, however, come in the higher priced goods.

As the demand for embroidered hosiery is much larger than the production, the early orders will be the ones that come on time while later on delays will be unavoidable. Small neat designs are chosen mostly. Some buyers take Scotch effects in small spots, while others prefer the old standard colors, red, white and blue These in many cases are bought in combination with black. At least three-quarters of the orders so far call for black goods. After that some tan assortments are bought and navy is also taken to a certain extent.

In embroidered lace hose good orders are also placed again and no doubt this class of goods will again be very popular. In fine gauge staple goods, the demand is at present very large and a great many orders have been placed for delivery for spring, 1906.

For men's wear, fancies will be good and large lines of striped and embroidered goods at the dollar limit are shown by the leading makers. The plaited styles seem to hold their own in men's goods and are shown in many new combinations of colorings.

Trade in gloves has improved somewhat, although it is still way behind expectations and the season will be rather quiet if more orders do not come in. After the severe cold winter in the United States more business was anticipated, but duplicates have not been received to any extent. What is going to sell for next spring in fabric gloves cannot be told just yet, but a few weeks may develop the styles suitable for the coming season.

THE MANUFACTURE OF SWEATERS.

BY WABASH.

With the advent of the sweater some years ago various opinions were expressed by manufacturers as to the staying qualities of the garment, many claiming that it was just a fad and would soon die out. Time has proved that the sweater has come to stay and the manufacturer who cannot run his

FIG. 1.

plant at a profit is usually the one who is behind the times.

Like other kinds of wearing apparel, styles in sweaters change. The flashy, broad stripes so much worn a short time ago have given way to more subdued colors with a narrow stripe in the cuff and a racked border. Other styles are plain throughout. Buyers have also been inquiring for something without the large roll collar, which, although it has its good points, is cumbersome and unattractive.

The style of sweater commanding the best price and which is undoubtedly the best, is made on a flat latch needle machine of which there are a number on the market. A very good garment, however, can be made on almost any of the automatic circular latch needle machines advertised for the purpose. The garment with the best feel and the most elastic is made of clean worsted yarn. The less washing the goods receive the more elastic they feel, in fact, the best grades are kept perfectly clean and finished with a slight steam pressing, just enough to take out the wrinkles, as knit goods cannot be washed in a machine with soap without fulling them more or less. If proper care is taken they can be washed by hand without fulling. Manufacturers who make their own yarns on wool machinery will find it a good plan to use as little oil as possible. Pure olive oil is the best. Use a cross band twisted yarn as this makes a more elastic garment and one that does not full as easily as a left hand twist. Elasticity is one of the chief requirements of this class of goods.

To wash carded wool goods use a good potash soap, not too strong, and water from 115° to 120° F., never to exceed 120°. When clean, rinse with water at the same heat, as cold water tends to harden the goods. When they are thoroughly rinsed, close the gate, taking care to have the goods just covered with water, and add one-half pint of ammonia to fifty pounds of goods, run for five minutes and then drain. This will brighten and soften the goods; then dry and finish with a light steam press.

Fig. 1 shows a coarse worsted sweater made on a circular automatic machine, six needles to the inch, 2-ply yarn. The collar and racked border are made on a flat Lamb machine and looped on the body. The sleeves are cut from cloth made with a royal rib stitch down to the cuff, then changing to

FIG. 2.

1 and 1 stitch, and finishing with a silk edging on the end of the cuff. The sleeves are also seamed on to the garment, all seams being covered with a 2-needle silk finish. This

is a coarse gauge, but the machines can be adjusted for any desired gauge or weight.

Fig. 2 is a new design of a fine gauge sweater made on a flat machine. The body is a royal rib like Fig. 1, with racked collar and border, imitation vest front with four

FIG. 3.

22-line pearl buttons down the front. The sleeve is royal rib to the cuff where it changes to 1 and 1 and has a silk finished welt. One great advantage of the flat machine-made goods is that they are selvage edged which make a ridgeless seam. Fig. 3

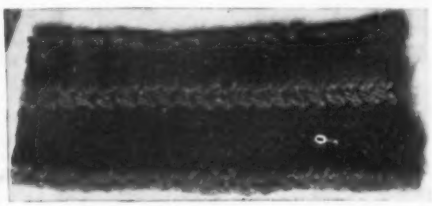


FIG. 4.

is a portion of the border and body cloth used for Fig. 1. Fig. 4 shows the collar for the same.

In the matter of production the circular machine is far ahead of the flat, as one boy or girl with very little experience can tend from four to six of these machines, whereas it requires a skilled hand for every flat machine. The production is about six to one in favor of the circular machine.

A KNOT AND LUMP DETECTOR.

The accompanying illustration shows a device recently patented in this country and designed for stopping a knitting machine when a knot or lump on the yarn approaches the needles. It is manufactured by the Wildman Mfg. Co., Norristown, Pa. The object of the invention is to provide an arrangement which will be simple in construction and with which the finger will not strike the needles when it is moved by a lump or knot.

A rock-shaft is used in place of a horizontal swinging arm, the rock-shaft being journaled in bearings in a standard, which is se-

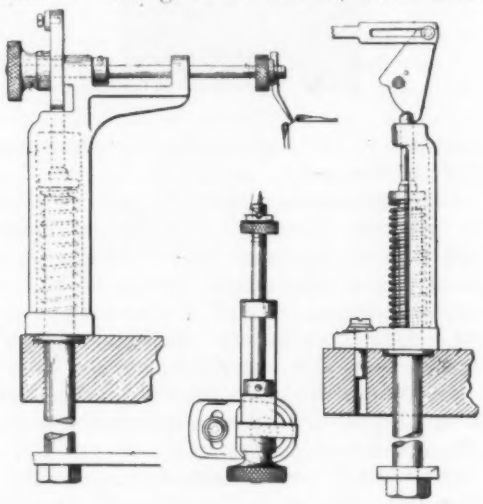


FIG. 1. FIG. 3. FIG. 2.

cured to the stationary base-ring of the machine. The rock-shaft has an opening extending vertically, which receives the shank of a finger extending downward and bent inwardly toward the center of the machine at a slight inclination. This finger is held in place by a collar and a nut. By loosening the nut the finger can be accurately adjusted. The rock-shaft is held in position longitudinally by a collar on the shaft. Between the nut and

the bearing an arm is arranged on the rock-shaft to rotate. The arm has a curved edge, provided with a recess in which fits the upper end of the stem, which is guided in the bracket, the stem being pressed upwardly by a spring, which at its lower end carries an arm which when raised is in the range of a series of pins on the rotating part of the machine.

If the rock-shaft is turned to move the arm so that the recess is withdrawn from the upper end of the stem, the stem is free to move upwardly, and thus lift the arm. In this action the end of the stem will ride along the curved edge of the arm until it arrives at the recess. The arrangement is such that only a slight movement of the finger is necessary to withdraw the recess in the arm from over the end of the stem, allowing the spring to exert its force and elevate the stem and the arm.

An important feature of the device relates to the arrangement of the protecting-finger in relation to the needles, for it will be noticed that, as the said finger is carried by the rock-shaft, its lower end will describe a rising arc when it is moved by the knot or lump, and thus it will move away from the needles. The arm on the rock-shaft is provided with an upward extension, to which a link is connected by a slot and pin, the link being connected with any suitable detector device arranged to catch a knot or lump as it passes from the bobbin and to operate the arm some time before the knot or lump arrives at the needles of the machine.

A CIRCULAR KNITTING MACHINE.

The knitting machine shown in the accompanying illustration has been designed to provide means by which the cap plate may be raised from the dial for rendering the under side accessible without removing the arch or disturbing the adjustment of the plate and dial. Fig. 1 is a sectional and elevated view of the knitting-machine. Fig. 2 is a top view of the needle-presser and dial.

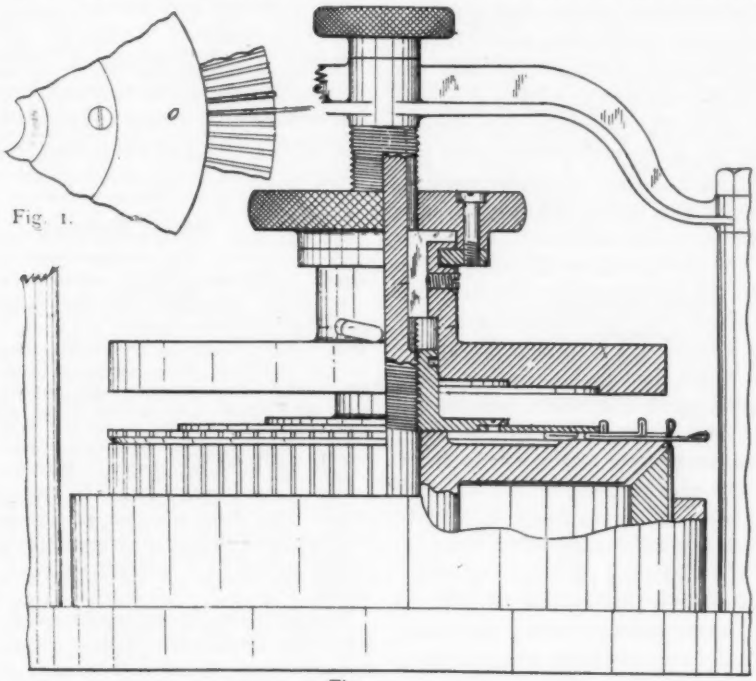


Fig. 1.

Fig. 2.

The dial-shaft is provided with screw-threads. Engaging with these threads is a coupling-nut, which is attached to the cap-plate by an inwardly-projecting disk or ring, adapted to engage a groove cut in the upper portion of the hub of the cap-plate. To permit its introduction into the groove, the ring

is made in sections, which are secured to the coupling-nut. To prevent the cap-plate from revolving when it is elevated by the coupling-nut the dial-shaft is provided with a groove, in which a key slides. The key is mounted in a corresponding groove cut in the hub of the cap-plate.

The needles are held in position by the needle presser when the cap-plate is raised. This presser is provided with a hub adapted to fit inside a recess within the hub of the cap-plate.

The needle-presser is brought down on the heels of the needles by giving it a slight turn with a key inserted through the slot in the hub of the cap-plate, the key engaging a cavity in the hub of the needle presser. To permit the adjustment of the needle-presser the slot and the cavity are so placed that they will coincide with each other when the cap-plate is brought down to a normal position on the dial. The cap-plate is then raised by turning the coupling-nut, the under side of the cap-plate being thus made accessible and suspended in an elevated position, as indicated at Fig. 1. When the cap-plate is again lowered to its proper place, the needle-presser is elevated slightly by giving it a turn in the opposite direction from that just described, this being accomplished in the same manner or by inserting a key through the slot or keyway. The needle-presser thus releases its grip or contact with the heels of the needles and permits them to be operated as usual. A further advantage of the threaded connection between the dial-shaft and the cap-plate by the intermediate coupling-nut is that a more delicate adjustment between the cap-plate and the dial can be made than is possible to obtain by means of a set-screw, which has heretofore been employed for the purpose of holding the cap-plate to the dial-shaft. When the required adjustment of the cap-plate has been obtained, the cap-plate may be held perfectly rigid by the set-screw which engages the key.

The cap-plate may be raised so as to make the cams accessible without disturbing the work in progress on the machine, as the needles are held in position by the needle presser or retainer, this being a feature of great utility and advantage in this class of machines.

A NEW CIRCULAR SPRING NEEDLE MACHINE.

The Tompkins Bros. Co. of Troy, N. Y., is bringing out a new circular spring needle machine for flat and fleece work. There is an impression that fine goods cannot be made in this country as perfect as the French and Germans make them, and that we have sacrificed quality for quantity. This new machine is believed by the builders to produce knit goods as perfect as any French or German product, and yet as rapidly as by the American system. It has the advantages of the jack sinker machine in making an even stitch, knitting worsted and silk, and plaiting, but with all the advantages of the loop wheel machine. The company invites correspondence.

Plated Knitting.

Editor Textile World Record:

In plating one and one plain rib on latch needle machines using cotton that is coarser than the worsted, can the same be knit to have all the worsted on the face and show no trace of it whatever on the back? For example, 40 worsted and 16 cotton; 40 worsted and 24 cotton; 40 worsted and 24 and 12 cotton. Charles (519).

I do not think it possible to take a cotton thread, which is considerably larger in size than a worsted thread, knit them together plated and expect the finer worsted thread to cover entirely the coarser cotton thread so it will not show on the back or inside.

Plated knitting, as the word implies, is the covering of one thread with another, and it is, of course, desirable that the more expensive thread should cover the cheaper one. The coarser the cheaper one is, the cheaper the garment can be produced. In the article in the November number of the Textile World Record on plated knitting, by Esek Easton, it is stated that when the cotton and worsted or wool threads are the same size the cotton can be almost or entirely covered by the worsted. If the cotton is coarser than the worsted it must necessarily show through the wales of the knitting, and the coarser the cotton in proportion to the worsted, the more it will show. The November article also refers to plating plain stitch knitting by using two separate sinker burrs so that a longer

stitch can be made on the burr feeding the worsted or wool thread. In such case it is possible to cover a cotton thread that is a little larger, but in one and one rib stitch on latch needle machines, the stitch of one thread cannot be made longer than the other. A 40 worsted thread is equal to a 26 2/3 cotton; therefore I should say a 40 worsted and a 24 cotton ought to be nearly covered. This can be facilitated by having a tight tension on the cotton thread and a slack tension on the worsted. A 16 cotton or a 24 and 12 cotton together are so much larger than a 40 worsted that I do not see how they can be knit together, plated, and not have the cotton show on the back or inside.

Esek Easton.

Softener for Knit Goods.

Editor Textile World Record:

What is a good softener for knit goods made of mixed cotton and wool, on which union dyes are used? Union dyes on merino goods or on mixed cotton and wool goods invariably give a harsh, gritty or wiry feeling, which is no doubt due in some instances to the presence of Glauber salts. Some goods containing 70 per cent. of fine wool and the remainder cotton come out harsher after being dyed with a merino dye than other goods that contain only 25 or 30 per cent. of wool but which have been treated with a softener or dyed in a different way. Is there anything that will soften these goods and take out the harsh feeling? Knitter (503).

I do not believe that Knitter is on the right track in assuming the presence of Glauber salts to be the cause of harsh feeling in his goods. If that were so it would be a universal trouble, as unions are always dyed with Glauber salts (sulphate of soda) or bisulphate of soda to keep the dyestuff from going on the material too fast and to assist in the level dyeing of the goods. If Glauber salts is the cause of the harshness (which I doubt, as it is contrary to all my experience) then the remedy is plain: Wash the goods well after dyeing, first with warm water (about 120 degrees F.) and then with cold water.

The trouble might be caused in several ways. The yarn might be spun too hard. It might be caused in the knitting and after dyeing it might be caused in the drying. Fine woolen goods should not be dried at too high a temperature or remain too long in the drier. It is much better to dry fine woolens with cold air or at a low heat. Again, the harsh feel might come from using too strong a lye in the scouring bath. It is better to scour with carbonate of ammonia, though it is somewhat more expensive, than carbonate of soda.

Knitter writes as though he dyes his merinoes after they are knit. Is this not contrary to the general practice? So far as I know, in all cases where cotton or wool is used to make merinoes the wool is dyed the color wanted and a mix made in the picker room, adding the amount of cotton needed. When the mix has been made up and ready for the picker, the carder adds an olive oil emulsion to the batch to make it softer. I also think that better results would be attained with the solid colors if the cotton and wool were dyed in the raw state and mixed in such proportions as wanted by the picker, then when the goods were knit they could be scoured and finished in the usual manner.

For fine merinoes that have no oil in the goods I use nothing but an olive oil soap at 90 to 110 degrees F. for a softener. Wash well, but do not handle too long or too roughly as the fabric is liable to felt. Baumwolle.

The best results will be obtained by treating the goods separately after dyeing in a bath made up with 1 1/2 to 2 per cent. of soluble alizarine oil. This is an entirely neutral compound and no other grade of softener is so well adapted for goods of this class. The bath referred to is best worked at 100 degrees F. as this does not influence the shade. Palmetto.

Sweater Sizes.

Editor Textile World Record:

What should be the length and width of the different sizes of men's and boys' sweaters?

Cambridge (509).

The following table gives a fair average of the sizes of sweaters as made by different manufacturers:

Dimensions for Men's Sweaters.

Sizes	Length	Width
34	26	13
36	27	14
38	28	15
40	29	16
42	30	17
44	31	18
	Boys'.	
26	21	11
28	22	11 1/2
30	23	12
32	24	12 1/2
34	25	13

*Oregon, Albany. We have been advised that part of buildings and small part of machinery of the Bannockburn Manufacturing Company was saved. Nothing has yet been decided regarding rebuilding, but it is possible that same will be done with increased capacity and a knitting plant also added.

Mill Discipline.

Editor Textile World Record:

What are the best methods to follow in order to maintain strict discipline over female employees of a knitting mill in a place where help is scarce and therefore independent, and where it is not policy to discharge them in order to maintain proper discipline? Our female help are in the habit of coming to their work late both in the morning and at noon, especially the piece workers, who think they are the only losers by being late at their work.

Morrison (471).

How to maintain discipline over female employees in a knitting mill is a complex question where labor is scarce and the help independent. The best method is to arouse in the mind of every operator a lively interest in her work, show no favoritism and yet have each one feel that she is the special object of your attention. In this way their confidence will be gained and this will bring out the best that is in them. In one mill I found it necessary to discharge an operator who made a practice of coming in late, on account of the influence she had over the rest of the help. Others began to come in late and when asked the reason said they had been in town shopping. When trivial excuses were given I always talked the matter over with them in a kindly way, and by calling attention to the prompt girls who earned the best wages, showed the late comers the difference. By so doing I was able to convince those who were in the habit of coming in late how much more they would earn by being on hand when the mill started. They were allowed to dance during the noon hour, and those who went home to lunch would hurry back to take part in this recreation.

Such a course will awaken the interest and attention of the employees and in no way injure the discipline of the mill. If managers will show a reasonable interest and consideration for those under their charge, endeavoring to gain their confidence and respect by kind treatment, the unruly can be easily controlled and made to conform to the mill rules.

It is usually hard work to convince piece workers that the loss of time concerns any one but themselves. I try to show them how they can earn more and thereby be of more value to the mill, and that their loss of time means not only loss to to them financially, but also restricts production and incidentally affects all succeeding departments in the mill. The entrance door should be closed shortly after the mill starts, and those who come late should be required to pass through and report at the office.

Some mills do not have rules posted for the guidance of the help. These are very essential and should be placed in conspicuous positions. When a rule is disobeyed call the operator's attention to it in a kindly way.

If the person in charge of the help uses such methods as these he will have but little trouble with tardy employees. I have always tried to follow the golden rule in my treatment of the employees under my charge, and by so doing have secured the respect and esteem of all the employees. I would recommend this system to the guidance of those who may have found the problem of handling female employees a difficult one. Finisher.

Recent Knitting Patents.

KNITTING MACHINE. 786,938. Joseph W. Adams, Wissinoming, Pa.

KNITTING MACHINE. CIRCULAR. 786,345. Herbert R. Campbell, Prospect, and Frederick Yahn, Haledon, N. J.

KNITTING MACHINE STOP Motion. 787,115. George W. Ruth, York, Pa., assignor to Ruth Automatic Knitting Machine Co.

KNITTING MILL NEWS.

New Mills.

*Illinois, Chester. Wm. Barnard is president of the Chester Knitting Mills, recently reported incorporated with capital stock of $20,000 and L. H. Gilster, treasurer. J. H. Rickman will be superintendent of the plant.

New Jersey, Burlington. The Burlington Knitting Company, which has just been incorporated with the following officers: President, H. W. Carman; secretary and treasurer, W. C. Farner, both of Burlington; and manager, F. C. Eltonhead, of Vineland, N. J., will manufacture knit underwear and will locate itself in a large factory formerly occupied by a shoe company, which is now being made ready for its occupancy. The concern, which expects to start up about May 1st, will employ about 100 hands.

*New York, Stuyvesant Falls. The new knitting plant established here by Chas. L. Ashley, is operated on gloves, caps, sweaters and mittens and is equipped with ten knitting machines.

*Ohio, Barnesville. G. E. Hunt is president of the Barnesville Hosiery Co., recently reported incorporated with capital stock of $15,000. J. W. Wise is treasurer of the company. The mill will be equipped with one set cards and 25 knitting machines and dye house. Wm. Iselin & Co. will sell the goods.

Ohio, Toledo. A new knitting plant is to be established here by Rudolph Miller, formerly with the Ohio Knitting Mills.

Pennsylvania, Philadelphia. Messrs. J. & L. Rubin have just started up the United Knitting and Manufacturing Co., at 441 North 2d Street, where they are manufacturing ladies' blouses, golf

vests and Norfolks on 8 knitters and 8 sewing machines, which are run by hand and electricity. They are now getting out their samples for the coming season. Mr. A. Rubin has charge of the plant and L. Rubin does the buying.

Pennsylvania, Philadelphia. The Wallace Knitting Mills are just starting up at Unity and Leiper Sts., Frankford, where they will manufacture Eiderdowns on 12 machines. Hugh Wallace, of Detroit, Mich., is the proprietor and Alfred Martin the superintendent. The production will be sold direct.

Enlargements and Improvements.

*Alabama, Huntsville. Work has begun on the erection of an addition to the Rowe Knitting Company's plant. Machinery from the mill formerly operated at Amsterdam, N. Y., will be installed.

Alabama, Talladega. A new brick building is to be erected for the Talladega Hosiery Mills. They will install 25 additional knitting machines and other equipment (ordered).

Georgia, Cedartown. It is reported that the Cherokee Knitting Company contemplates installing additional knitting machines.

Massachusetts, Canton. James T. Meadows has made an enlargement to his mill and installed a new engine.

Massachusetts, Stoughton. A new storehouse, 50 by 64 feet, is to be erected for Charles Stretton & Sons.

Massachusetts, West Roxbury. The Oakes Knitting Mills are being removed from Cambridge, as was reported last February. It is expected to have the plant in operation at new location by May 1st.

New Hampshire, Ashland. The Ashland Knitting Company will instal a modern steam 150 h. p. boiler in the plant this summer.

New Jersey, Haddonfield. It is reported that the Estaugh Knitting Mills Co., which started its operations at this place about three years ago is contemplating the removal of their plant to another location where help can be secured in greater abundance; possibly the city of Camden, a few miles from this town. The mill, under Mr. Robert T. Wood's supervision, has been meeting with much success and has been increasing its capacity from time to time. When the new quarters are secured the plant will again be enlarged to meet the demand for their goods. They manufacture ladies' vests.

New York, Oneida. It is reported that the Oneida Hosiery Company is in need of larger quarters and proposes leasing a building, about 125 by 50 feet, three stories, with privilege of buying.

North Carolina, Littleton. It is reported that the Littleton Hosiery Mill contemplate installing a complete dyeing and finishing plant.

*North Carolina, Winston-Salem. The new building for the Maline Mills has been completed.

North Carolina, Winston-Salem. The Shamrock Knitting Mills, manufacturers of fine gauge hosiery, have placed order for 10 additional knitting machines. They have recently placed 10 new machines in the mill.

Ontario, Galt. Another set of carding and spinning machinery is being installed in The C. Turnbull Co.'s plant.

Pennsylvania, Allentown. Contract has been let by the Southdown Knitting Company for erection of two new buildings 100 by 40 feet, one and three stories, for the dyeing department.

Pennsylvania, Doylestown. An addition is being built to Drenk & Brewer's dye house.

*Pennsylvania, Fleetwood. Work is nearly completed on the new addition to D. F. Kelchner's hosiery mill and operations shortly started in same.

Pennsylvania, Hawley. Sands & Holden, manufacturers of sweaters, have removed to larger quarters.

Pennsylvania, Nazareth. Ten new full automatic knitting machines have been installed recently in the Wunderly Hosiery Mill.

Pennsylvania, Philadelphia. The Liberty Bell Hosiery Mills, 4318 Frankford Avenue, have been incorporated with a capital of $25,000 with the following officers: President, D. C. Dalsimer, 47 Leonard Street, New York; treasurer, Ernest C. Locke; secretary, Ernest J. Aucott. This establishment was formerly run under a partnership known as Locke & Aucott. This concern is now operating 100 machines, all of which have been equipped with their own patented appliances, for the manufacture of ladies' hose and infant's fine striped and fancy hosiery of cotton, worsted and mercerized yarns. Goods will be sold through their New York office, 47 Leonard Street. They are now getting out a line of new samples.

Pennsylvania, Philadelphia. An addition three stories and a half will be made to the factory of Messrs. H. C. Aberle & Co., Bodine above Cumberland Street, for which bids are now being asked by the contractor. This concern manufactures full fashioned hosiery and is very busy.

Pennsylvania, Philadelphia. M. A. Metz & Bro., proprietors of the Alphia Knitting Mills, making knit and crochet goods, have removed from 319 North Second Street to 310-312-314 North Orianna Street, where they have increased and improved facilities.

Pennsylvania, Reading. The Consolidated Knitting & Spinning Mills are to replace all of their 7/8s automatic hosiery machines with full automatic seamless machines. About 100 will be installed at first. They will also add 10 Bonnaz embroidery machines in mill No. 3.

*Pennsylvania, Richland. The Richland Knitting Mills will install new full automatic seamless hosiery machines (ordered) in place of present machinery. This will be done gradually so as not to interfere with daily operations.

Pennsylvania, Schuylkill Haven. Work is under way on erection of a two-story addition to Darius Coldren's knitting mill.

South Carolina, Landrum. The Blue Ridge Hosiery Mill is to instal 25 new seamless machines in the plant.

*Tennessee, Chattanooga. The Chickamauga Knitting Mills advise us that they had been planning to increase the production to some 350 dozen per day, which would have necessitated a new building, but conditions have been so unsatisfactory thus far that for the present they will merely add a few machines, bringing the output up to about 250 dozen daily.

Tennessee, Sweetwater. Work has been started on an addition to the Mascot Hosiery Mills. The new building will be 60 by 40 feet, three stories and basement. New machinery will be installed.

*Tennessee, Sweetwater. The Mascot Knitting Mills, which have begun work upon erection of a new building, will add ten new machines to their equipment, which will give them a total of 120 when completed.

Mills Starting Up.

*New Hampshire, Tilton. Operations will soon start in F. P. Stewart's mill.

*New York, Warsaw. The Oatka Hosiery Co. has resumed operations for five or six weeks for purpose of finishing up orders.

Mills Shutting Down.

North Carolina, Winton. The Winton Knitting Mills, operated on seamless cotton half-hose, have been closed indefinitely.

Facts and Gossip.

*Georgia, Macon. The creditors of the Schofield Mfg. Co., which was reported petitioned into involuntary bankruptcy in February, have accepted an offer of 30 cents on the dollar. The liabilities of the company are placed at $53,403.52, with assets of $31,301.38. No steps have yet been taken to dispose of the plant.

Iowa, Spencer. It is reported that the business men of this place are considering a proposition made relative to locating a knitting mill here.

Michigan, Saranac. The Saranac Knitting Company has been incorporated with capital stock of $10,000. The Business Men's Association is reported as interested.

New York, Greenwich. The Gordian Mesh Underwear Co. is reported as considering removal of plant to Middle Village.

New York, Fort Plain. The Bailey Knitting Mills have been incorporated with capital stock of $75,000.

New York, Utica. The Capron Knitting Co. has taken an office at 350 Broadway, where all business will be done direct. W. R. Schremp, assisted by John Bruhn, will be in charge.

North Carolina, Winston-Salem. J. A. Smith is reported as interested in establishing a textile finishing plant here and propose erecting a building 200 by 100 feet, one story, for the purpose.

North Carolina, Winston-Salem. The Wachovia Knitting Mills and the Maline Mills have been consolidated as the Maline Mills. A new building is under construction and when completed will be occupied by the new company. W. L. Seiwers will be president and manager of the new company; Thomas Maslin, vice-president, and W. J. Peterson, secretary. There will be a total equipment of 42 knitting machines and 60 sewing machines, making ladies' light weight underwear exclusively.

*Ohio, Roscoe. It is reported that the T. Roscoe Knitting Company will rebuild their mill on a much larger scale than the old plant.

Pennsylvania, Carbondale. It is reported that negotiations are underway for an underwear factory at this place.

*Pennsylvania, Glen Riddle. The machinery of Samuel B. Rhoads' mill has been sold to Robt. E. Boyle, at Norristown.

Pennsylvania, Macungie. R. F. Moyer & Co., proprietors of the Valley Knitting Mills, have dissolved partnership. R. F. Moyer and John L. Reinhard will continue operating the Valley Mills on hosiery. A new firm, to be known as John Rems & Sons, (Mr. Rems retiring partner of the Valley Mills) will continue the underwear department. They will occupy same building until new quarters can be secured.

Pennsylvania, Philadelphia. The Wallace Knitting Mills recently started up at Unity and Leiper Streets, Frankford, for the manufacture of eiderdowns, jersey cloths and a general line of knit goods; has changed its name to the Mayflower Knitting Mills, which is operating 12 knitting machines, 1 napper, 2 chinchillas and 1 winder and buying cotton and woolen yarns in numbers from 18 to 22; Mr. Martin formerly of the E. H. Godshalk Co., being the manager and buyer. This company is owned by Mr. Hugh Wallace, proprietor of the Western Robe Co., Detroit, Mich., where he is manufacturing the same class of goods on 22 knitters and 40 sewing machines, also dyeing, bleaching and finishing the goods, the production of both plants are to be sold through the New York office at 725 Broadway.

*Pennsylvania, Richland. A. C. Haak, successor to the Rickland Knitting Mill, operates the mill on hosiery, with equipment of 28 knitting and 5 sewing machines. These goods are sold through D. C. Dalsimer.

Wisconsin, Milwaukee. The Gem Hammock & Fly Net Co. is reported as contemplating erection of a large building to which their various departments will be removed.

Wisconsin, Milwaukee. The Hand Knit Hosiery Co. has been incorporated recently with capital stock of $7,000. L. A. Bentz, H. I. Pease and A. M. Bentz are the incorporators.

Personals.

T. F. Burke has resigned as foreman of the spinning room at the Norfolk & New Brunswick Hosiery Company, Norfolk, Conn., and has secured work in Hartford.

Carl Palme, formerly general manager of the Harold Hosiery Company, Philadelphia, Pa., has been engaged as superintendent of the Nashville (Tenn.) Hosiery Mills Company.

New Machinery and Processes.

This department is designed to present from month to month a brief mention of new machinery, devices, and processes being brought out in this country and abroad, that are of interest to textile manufacturers. It is not a list of patents, but of improvements coming on the market. The idea being to present to our readers a systematic monthly record of new machinery, etc., of interest to textile mill men.
We invite machine builders and others to send us such information for this department.

Banding Machine. Draper Co., Hopedale, Mass., have recently adopted a new banding machine which is described in another part of this issue.

New Spring Needle Knitting Machine. The Tompkins Brothers Co., of Troy, N. Y., is putting on the market a new circular spring needle machine for flat and fleece work, which has the advantages of the jack sinker machine in making an even stitch, knitting worsted and silk, and plaiting, but with all the advantages of the loop wheel machine. Full information may be had upon application.

Ring Frame Bobbin. John Dixon & Sons, Steeton, England. A bobbin with a metal ring inserted around the bore at the tip to prevent the bobbins from becoming slack at the spindle point. The bobbin is being used in a number of Lancashire textile mills.

Roller Cotton Card. Tweedale & Smalley, Castleton, England. The top flat cotton card is now in such general use that the use of the roller card seems like looking backward. Many manufacturers, however, prefer the roller card for certain low counts and to meet their demands Tweedale & Smalley have recently built an improved roller card embodying all the features that experience has proved to be desirable. It is built with a 15-inch cylinder and 26-inch doffer.

Sliver Cans and Bobbin Boxes. S. Noton & Son, Oldham, England, are placing on the English market sliver cans and bobbin boxes made of fibrous material which is manufactured from flax waste. It is said that the raw material is imported from the United States. The cans and boxes are reported to give excellent satisfaction.

Fancy Yarn. Leon Valencon, Verviers, Belgium, has recently brought out a new device for making fancy yarn on twisters.

Ring and Traveler. Cook & Co., Manchester, England. The traveler consists of a stamped-out circle having a hook or goose-neck projecting at one point through which the yarn passes. It is stated that the frame can be started with the yarn at any part of the lift and that a speed of 1,300 turns per minute can be successfully maintained on cotton yarn.

Warping and Beaming Machine. Lightowler & Keighley, Bradford, England. A new model of a warping and beaming machine embodying many improvements, which it is claimed results in giving a very large and perfect production.

Yarn Dryer. James Keith & Blackman Co., Ltd., Manchester, England. An improved dryer for skein yarn, which it is said dries very rapidly and handles the yarn with practically no danger of injury.

Vacuum Dyeing Machine. Tattersall & Holdsworth, Burnley, England. A vacuum dyeing machine which can be adapted for cops, cheeses, spools, piece goods and raw material. It is a German invention and is said to be giving excellent results in England and on the Continent.

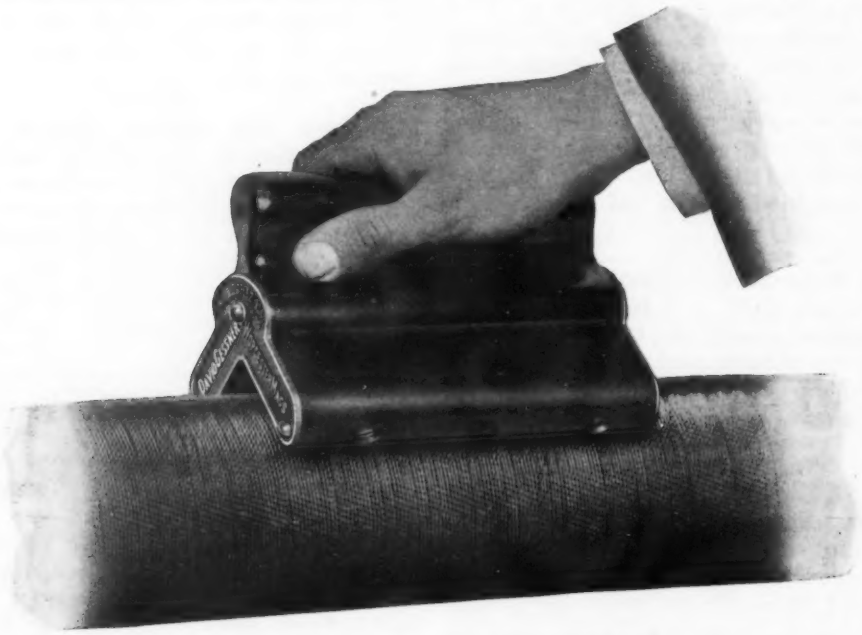
Cloth Napper. Tomlinson, Ltd., Rochdale, England, is placing on the market a new napper with thirty-six rolls. A very large production is claimed for the machine.

Cylinder Rib Knitting Machine. T. Grieve & Co., Leicester, England, are placing on the market a circular knitting machine for making selvage knit goods. The advantages of using a circular machine for flat goods with selvages is said to be a lower labor cost and larger production of the circular machine. Goods of any width up to within two inches of the circumference of the cylinder can be made.

NEW DOUBLE-ACTING STRICKLE.

DAVID GESSNER, Worcester, Mass.

The accompanying cuts represent an improved form of strickle for sharpening or touching up the card wires, workers and strippers of carding engines or napper rolls, as used in planetary napping machines. It consists of a holder or housing which contains two blocks or bricks of emery with corrugated surfaces intended to match the open spaces between the rows of wires with which the card or napping rollers may be covered.



THE DOUBLE-ACTING STRICKLE IN WORKING POSITION.

The angle at which the emery blocks are held in the strickle can be varied to meet the requirements of the different sizes of card covered rollers; or they may remain fixed if used only for rollers of uniform diameter, as represented, for instance, in one of the cuts, where the strickle is shown straddling the worker roll of a napping machine. By thus furnishing two grinding areas, as against one in the ordinary flat strickle, twice as much grinding will be done in the same time with the improved strickle as results from the use of the flat strickle. Moreover, the improved strickle guides itself across the surface of the card covered roller without the least wavering or twisting, because it straddles its work.

There is actually only a small portion of a flat strickle used, and owing to the difficulty of guiding it, an inexperienced hand is liable to gouge into the wire with the ends of the strickle when the latter is being twisted sidewise by the revolutions of the roller. As the corrugations in the strickle-bricks of the improved strickle are at right angles to the axis of the roller, it does not matter whether the strickle is guided against the wind of the wire or with it. Should the roller which is being ground with this strickle contain wires which in places have been crowded out of their original or natural position when the clothing was new by obstructions passing through the machine during carding or napping, the fine narrow ridges of the strickle blocks have every opportunity to wedge them apart because of the longitudinally open space intervening between the two emery bricks, and also because of the open spaces with which the bricks are supplied crosswise. For instance, should two wires be crowded together between two consecutive

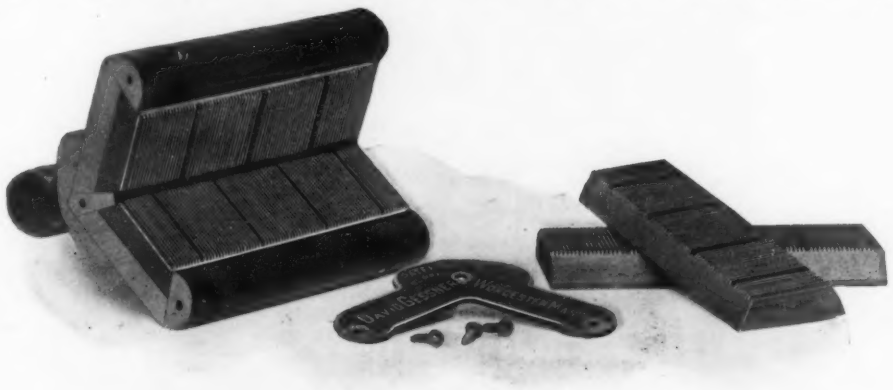
ridges of one brick, the longitudinal open space between the two blocks would give them a chance to spring apart before entering the ridges of the other brick, and thus give the ridges of the second brick an opportunity to enter between them. For this reason, when making the bricks, the ridges of one brick are set in a staggered position to those in the opposite brick. To aid further this process of getting between crowded wires there are open spaces pressed into the brick crosswise, set also in a staggered position, so as to give the wires that are bunched together a chance to open out every now and then and allow the ridges of the opposite brick to enter between them. This results in greater uniformity of work and secures a thorough side-grinding as well as surface grinding of all the wire points. That portion of the bricks which is gripped by the housing is dovetailed in shape, in order to be slipped in or out of the holder without any difficulty. To prevent any movement endwise, little bronze plates are attached, which can be readily detached and put back whenever a renewal of blocks is desired.

Different numbers of emery are used in making bricks of varying grinding or cutting capacity and these bricks are numbered correspondingly. Thus for wires that are quite dull a coarser and softer grade of brick would be better than a harder grade if one wishes to get quick results, while for clothing that has been kept in fairly good condition, a harder grade of brick would suffice.

By keeping on hand different numbers of bricks the grade required can be slipped into the housing as wanted, and as soon as used up it is readily exchanged for a new one.

The housings are made in the most substantial manner and are practically indestructible. They are made of such form as never to expose the emery brick itself to contact when laid down. If dropped on the floor or thrown on a bench, the housing only can strike, no matter how the holder falls.

We are informed that this new strickle block is securely patented as an article of manufacture, as well as in combination with the housing shown and with other forms of housing, which form the subject matter of patent No. 751,165, issued on Feb. 2, 1904, to David Gessner, Worcester, Mass., who is well known as a manufacturer of several types of improved napping machines, rotary presses and other finishing machinery.



THE GESSNER DOUBLE-ACTING STRICKLE.

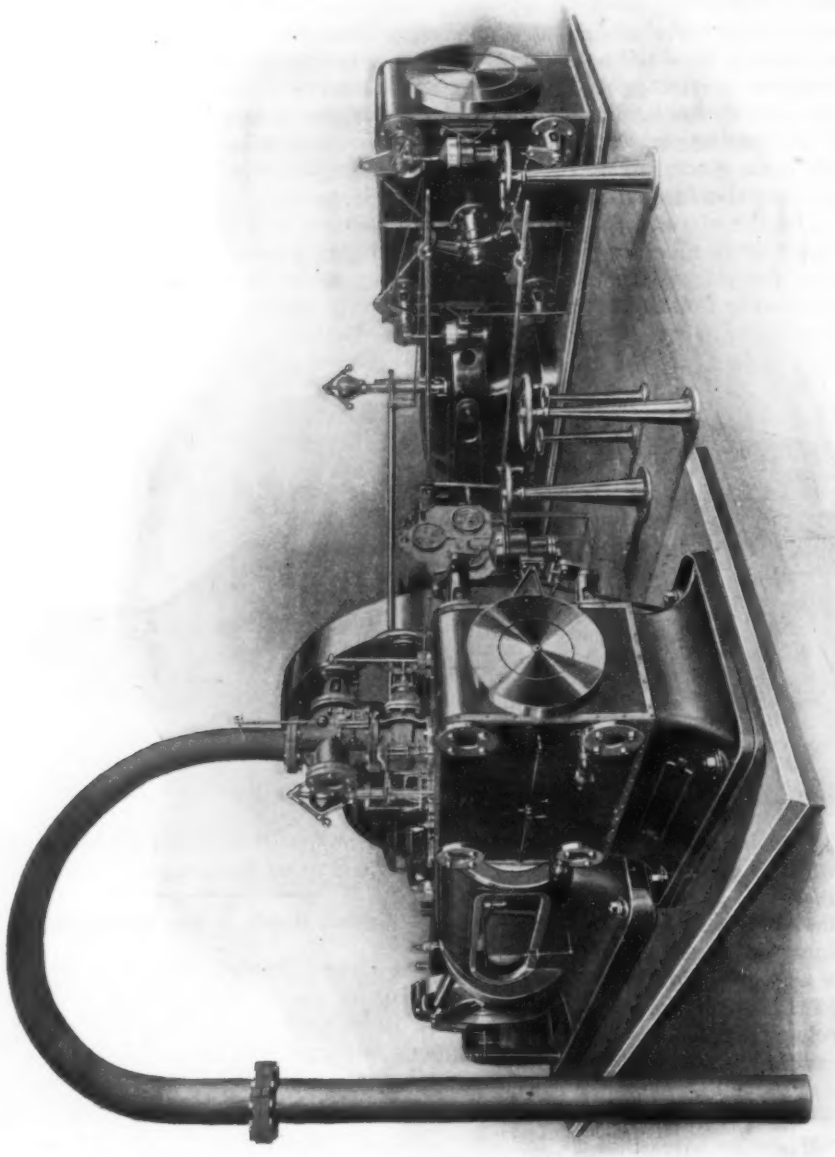
Cotton Goods in the Philippines.

The United States is still far in the rear in the cotton goods trade of the Philippines. The latest report to be received shows the goods imported into the archipelago in September, 1904, to have come from the different countries in the following proportion:

Great Britain	54.8 per cent.
Spain	19.6 per cent.
Switzerland	6.7 per cent.
British E. I.	4.3 per cent.
United States	4.3 per cent.
Germany	3.2 per cent.
Other	7.1 per cent.

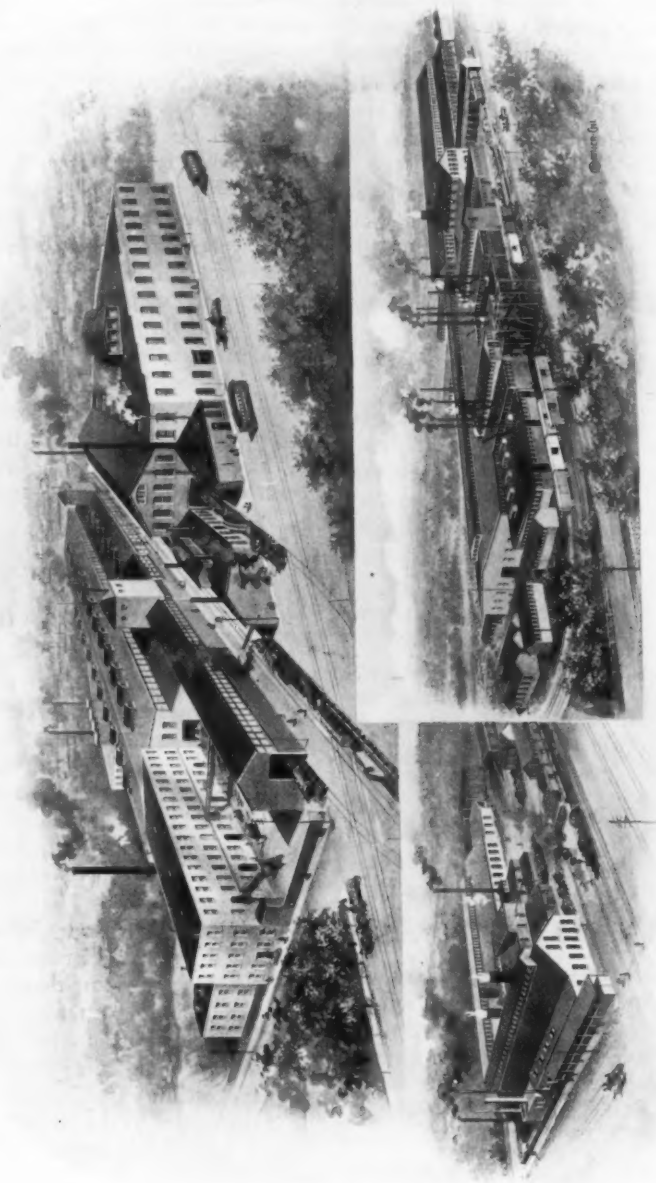
THE MURRAY COMPOUND CORLISS ENGINE.

In the accompanying illustration is shown the compound engine built by the Murray Iron Works Co., Burlington, Iowa. This company was incorporated thirty-four years ago and has plants in Burlington and West Burlington, Iowa, and Aurora, Ill. The Corliss engine is built at Burlington in shops fitted with special appliances for this line of work. The view of the big Burlington plant shows what an extensive establishment it is. The modern equipment and long experience



THE MURRAY COMPOUND CORLISS ENGINE.

of the company enable them to turn out an engine which they are confident will give as good results as any on the market. Owing either in the cross or tandem style. They are also designed and built to meet special requirements.



THE BURLINGTON (IOWA) PLANT OF THE MURRAY IRON WORKS CO.

to the importance of uniform speed in textile mills the compound engine which we illustrate will be of special interest to the textile trade. These compound engines are built

It is believed that the cross compound engine is the most economical for producing large powers with a steam pressure of 160 pounds or less. Steadiness of motion is thus

obtained which is hardly possible with any style of single crank machine. It is specially recommended for central stations or factories where a large amount of power is distributed over a large area in comparatively small units. The close regulation, great strength of the moving parts, large wearing surfaces, and the unusual weight and rigidity of the stationary parts of the engine, make it specially adapted for such a distribution of power.

The tandem compound engine is nearly as economical as the cross compound, and it is said that in some instances it even shows the same economy. It costs less for the engine and foundation and the space occupied, but where great steadiness of motion is required, the Murray Iron Works Co. recommend the cross compound.

In addition to a high quality of material the workmanship and merits of the Murray Corliss engine may be summed up as follows: The latest and most approved forms of frames suitable for every purpose; high speed ball-bearing governor with improved safety stops; a form of cylinder whereby the exhaust passages are insulated from the cylinder by a dead air space; improved valve motion; improved dash pots, supported by the cylinder feet; improved forms of steam and exhaust valves; an improved form of piston; fly wheels made in halves, free from initial strain; vertically adjustable outer pillow block with oil-retaining rim; broad pyramidal main bearing and cylinder feet; new and improved style connecting rod; improved cross head with adjustable shoes running in bored guides; smallest possible clearance volume.

Power users who contemplate an installation of a new power plant or an alteration in an old equipment, should correspond with the Murray Iron Works Co. before deciding upon a definite plan.

Great Britain and the United States have nine systems of numbering yarn, of which five are local and of small importance. The continent of Europe has thirty-five such systems.

NEUTRALIZING STATIC ELECTRICITY IN TEXTILE MILLS.

The presence of static electricity in textile mills is a source of many imperfections. The trouble is most serious in the carding and spinning departments where it causes uneven yarn, breaking down of ends and loss of production. No complete remedy for the difficulty had been found previous to the discovery of what is known as the Chapman process. Many appliances have been tried to remove the trouble and some have offered slight relief, but textile workers have generally concluded that the trouble is inseparable from manufacturing textile goods. It varies with the weather, temperature of the atmosphere and degree of moisture present. The overseer may have his work going through his room in perfect order one day and find the next morning that static electricity has thrown it into confusion, stopping machines and making it impossible to obtain a full production or perfect work.

By the Chapman process the static electricity is neutralized by passing a low alternating current by means of an inductor over the surface from which the electricity is to be neutralized. The alternating current thus offers either a positive or negative influence to the surface charged by the static electricity. If the latter is negative it is neutralized by the positive force of the alternating current; if it is positive it is neutralized by the negative electricity of the alternating current, and thus automatically the equilibrium is restored in the surface previously charged with static electricity.

An alternating charge of the proper voltage is supplied by a transformer of special design. This is fed from the ordinary lighting system in the mill, and consumes so small a current that its connection may be made by an extension plug in one of the lamp sockets. A single wire with special insulation is run from the transformer to the several machines to be treated, where it is connected to the inductor for distributing the influence. The transformer is bolted overhead in any convenient place and connected permanently by wire with the inductor, which is in the form of a straight bar attached to the machine to be

treated at some point where the material may pass by it at a distance of a few inches. One transformer may do the work for several machines, depending on the number of square feet of surface per minute under treatment.

The process was first applied in the paper industry, on paper bag machines and printing presses with such success that it attracted the attention of textile manufacturers and they applied it in their mills with equally satisfactory results. It has been adopted in sixty mills. Among them are the following textile mills including woolen, cotton and silk: Worumbo Mfg. Co., Lisbon Falls, Me,; Columbia Mills, Lewiston, Me.; Cascade Woolen Mill, Oakland, Me.; Dana Warp Mill, Westbrook, Me.; Sanford Plush Mills, Sanford, Me.; Albany Felt Co., Albany, N. Y.; Lockport Felt Co., Newfane, N. Y.; Stroock Plush Co., Newburgh, N. Y.; Wanskuck Co., Geneva Mill, Providence, R. I.; Walter Hartley Victoria Mill, Thornton, R. I.; Greystone Mills, Providence, R. I.; Farr Alpaca Co., Holyoke, Mass.; Taconic Mills, Pittsfield, Mass; Standard Silk Co., Phillipsburg, N. J.; Tweedy Silk Co., Danbury, Conn.; Sidney Blumenthal Co., Shelton, Conn.; Salts Textile Works, Bridgeport, Conn.; Tacony Mill, Philadelphia, Pa.; Sauquoit Silk Mfg. Co., Philadelphia, Pa. After two weeks trial the Worumbo Mfg. Co. ordered the neutralizers applied to seventeen sets of cards. The process is controlled by the Chapman Electric Neutralizer Co., Portland, Me., who will supply full information upon application.

THE NEW PROCESS RING FRAME FOR WOOLEN YARN.

The present generation of textile workers, accustomed to spinning carded wool on the mule exclusively while the ring frame is used only for combed wool and cotton, look upon such restrictions to the use of the two systems of spinning as the unavoidable result of the inherent difference between woolen and combed worsted or cotton fibres. In this they assume that both have reached their highest development and apparently lose sight of the fact that both the mule and the ring frame are comparatively modern inventions. Invented in the closing decade of the eighteenth century and developed chiefly during the last half of the nineteenth, the ring

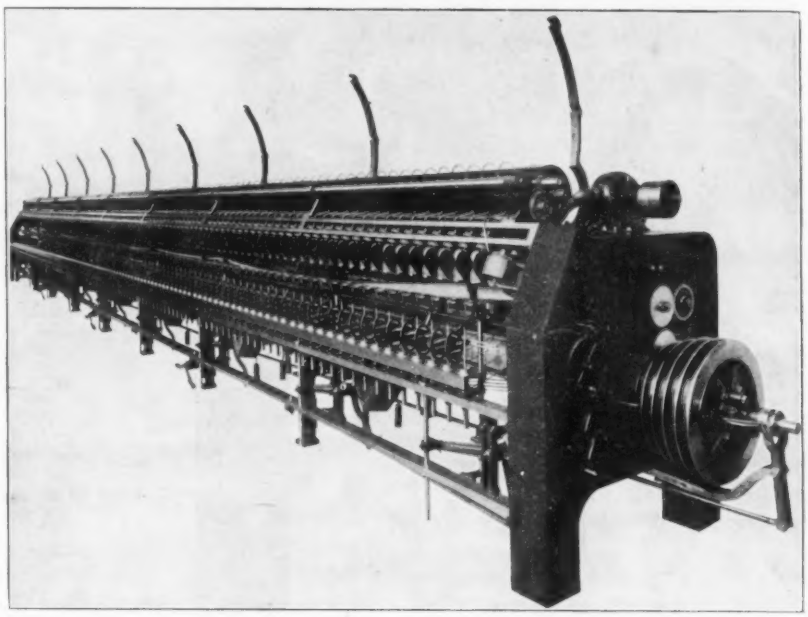


FIG. 1. THE NEW PROCESS RING FRAME FOR WOOLEN YARN.

frame has been confined to the spinning of worsted, cotton and linen, while carded woolen yarn has all been spun on the mule. This has been due to the difference in the length of carded woolen and worsted or cotton fibres, and has deprived woolen manufacturers of the advantages of ring frame spinning. Inventors have worked steadily on the problem of adapting the ring frame to carded woolen yarn, and success has been finally attained through the efforts of The New Process Spinning Machine Co. of Pittsburg, Pa., which is now building machines, shown in Figs. 1 and 2, that will spin wool or any other fibrous material under the wool system with advantages over the ring frame and mule. These advantages are in part summed up as follows:—

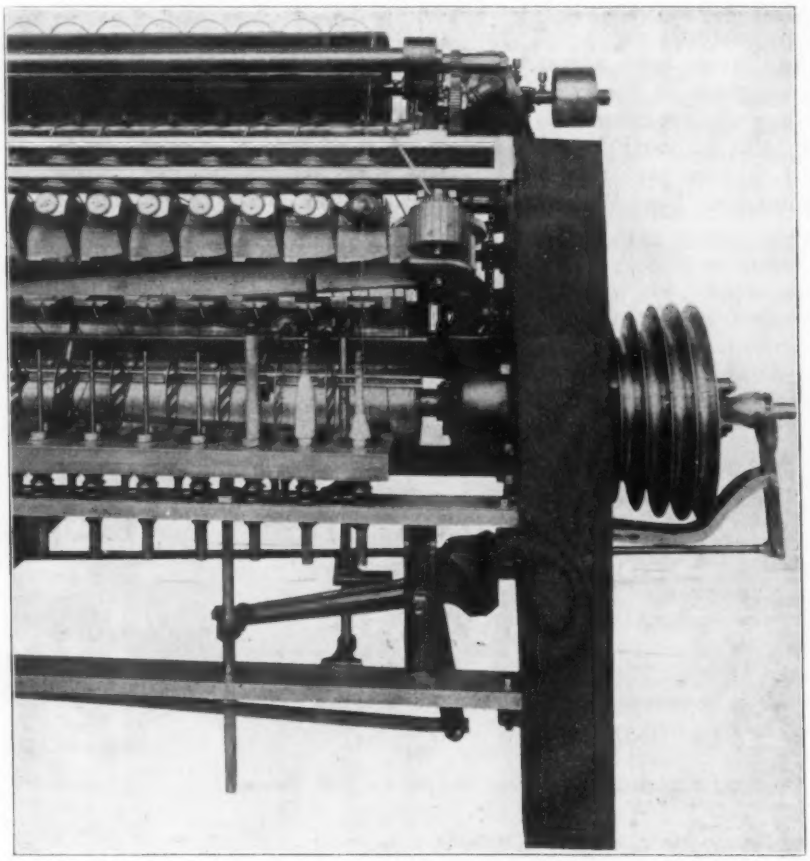


FIG. 2. A SECTIONAL VIEW OF THE NEW PROCESS RING FRAME FOR WOOLEN YARN.

Reduced floor space, only one-sixth the space occupied by the mule being required for the new frame.

Simplicity of construction and operation which makes it possible to dispense with skilled mule spinners and do the work with girls and boys.

Reduction in the labor cost of spinning as well as in the first cost of the machine and in the expenses for repairs.

The yarn can be wound tighter, thus increasing the capacity of the bobbin.

Increased production. No loss of time by winding the yarn, as spinning and winding are concurrent operations.

Smoother yarn, making a more perfect woven fabric.

No soft splices. Ease of splicing.

Yarn can be twisted harder than on a mule.

Less power required than with the mule. the 120-spindle machine starting with less than 5 H. P.

The advantages due to the simplicity of the machine include the following: No reciprocating motion and variation of speed; absence of noise and shock; machine is easily lined up even when floor is irregular; no twist motion to get out of order; cylinders last longer; no friction leather required.

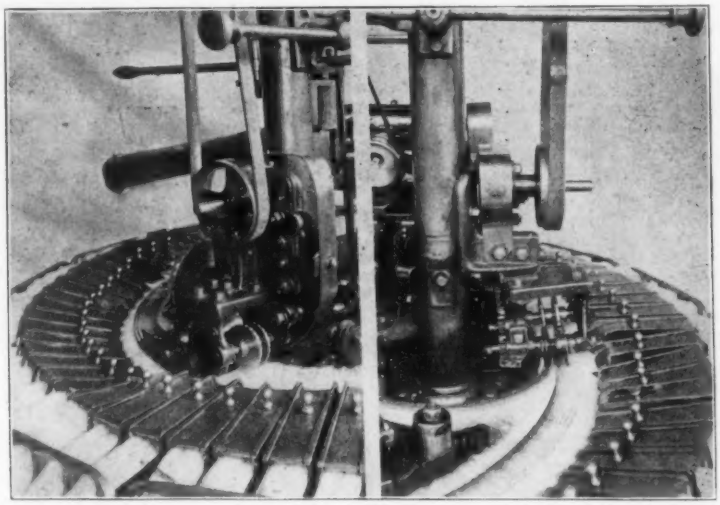
The machine automatically gathers up all waste and sliver when an end breaks and deposits it in a receptacle provided for that purpose.

Fig. 2 is an enlarged front view of a section of the machine, showing the working parts more clearly. The roving passes from the spools to a series of rollers, which not only draw the strand finer as with the cotton and worsted ring frame, but also introduce the necessary mock twist so that the inequalities in the roving are removed as by the ordinary woolen mule.

The machine has been thoroughly tested by the builders and is offered to the trade with confidence that it will meet the requirements of woolen manufacturers. A 120-spindle machine has been set up at 46 Park Place, New York City, where it can be seen in operation on a wide range of woolen yarn.

THE AMERICAN COMPELLATOR FOR WORSTED COMBS.

All combers of worsted know the difficulties connected with the operation of the dabbing brush, upon whose work depends the proper combing of the stock. The dabbing motion involves as many as ten perpendicular strokes of the brush per second, causing a slight vibration that makes necessary a solid foundation for the machine. The brush must run very fast in order to press the wool properly into the pins of the circle. The high speed makes it difficult to obtain a stroke long enough so that the brush can clear the wool lying on the pins. The wear on the brush and driving mechanism is very great. In order to get good work from the combs it is necessary that the brush should be in good condition at all times and the working parts in perfect order. If the dabbing motion is allowed to get out of repair the result is poor work, and the liability of a break down resulting in serious damage to the comb is greatly increased. The cost of keeping a dabbing brush in repair is very high, in some cases reaching $100 per year, and this in connection with its defects has led to constant efforts to find a substitute. It is only within recent years that success has been attained, this result having been reached by the



THE AMERICAN COMPELLATOR FOR WORSTED COMBS.

invention of the compellator which is shown in the accompanying illustration.

It consists of two or more disks, the lower edges of which pass between the pins of the circles and thus press the wool into the pins as the circles revolve. The compellator can be applied to a Noble comb without any alteration in the machine. It is easy of adustment and brush waste, dirt and flyings are reduced to a minimum. It does equally good work on fine or coarse wool including mohair and camel's hair. Expensive repairs are not necessary and this alone should be of sufficient advantage to recommend its adoption. With the compellator there is no vibration and as a consequence the comb can be run without a special foundation.

The production of a Noble comb is in most cases limited by the speed of the dabbing brush. It is claimed that by using the compellator the comb can be run at as high a speed as the other parts of the machine will allow; in other words, that the comb itself sets the limit of production. Among the other advantages claimed for this machine are the following:

No stopping of the comb to adjust brushes.

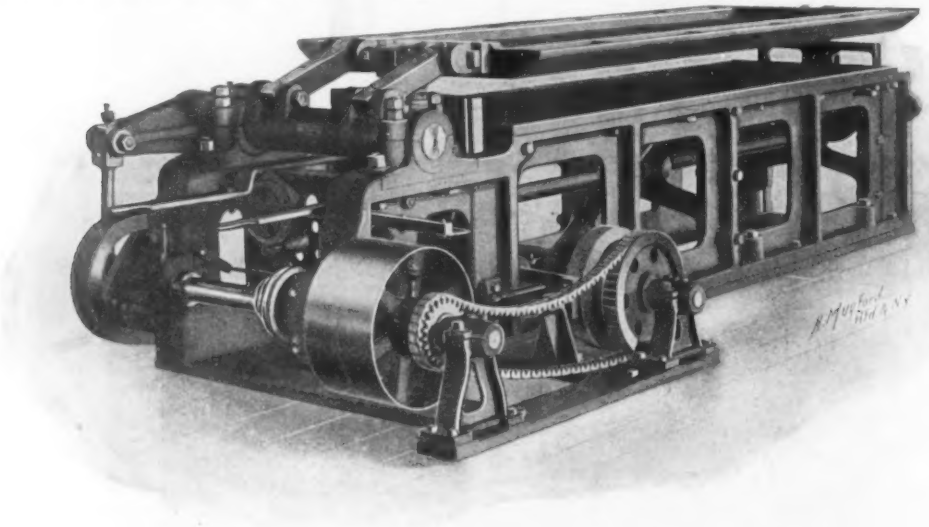
No adjustment of feed knives.

No brushes flying off, which is a constant danger with the ordinary dabbing brush.

Saving of apron leathers.

The wool is always put into the pins at the same point and is left free to draw out, allowing a closer nip with less weight on the drawing-off rolls than is otherwise possible, thus saving power and increasing production.

The compellator is manufactured by the J. S. Turner Mfg. Co., Lowell, Mass., and has been in operation in several of the leading New England worsted mills, to which anyone desiring information regarding it is referred. The manufacturers are so confident of the merits of their machine that they are ready to send it on thirty days' trial free of cost.



A SINGLE ACTING FELT HARDENER.

A SINGLE-ACTING FELT HARDENER.

The accompanying illustrations show a single acting felt hardener specially designed for the manufacture of felt sheeting. Each platen is 32 inches wide and 110 inches long. The top platen has two movements, vertical and horizontal, and operated by the drivi elts while the bottom platen is stationary. The vertical lift of the top platen is 6 inches, and the horizontal movement is variable from o to 5/8 of an inch. The hardener is al o made in the double-acting type in which both the upper and lower platens move.

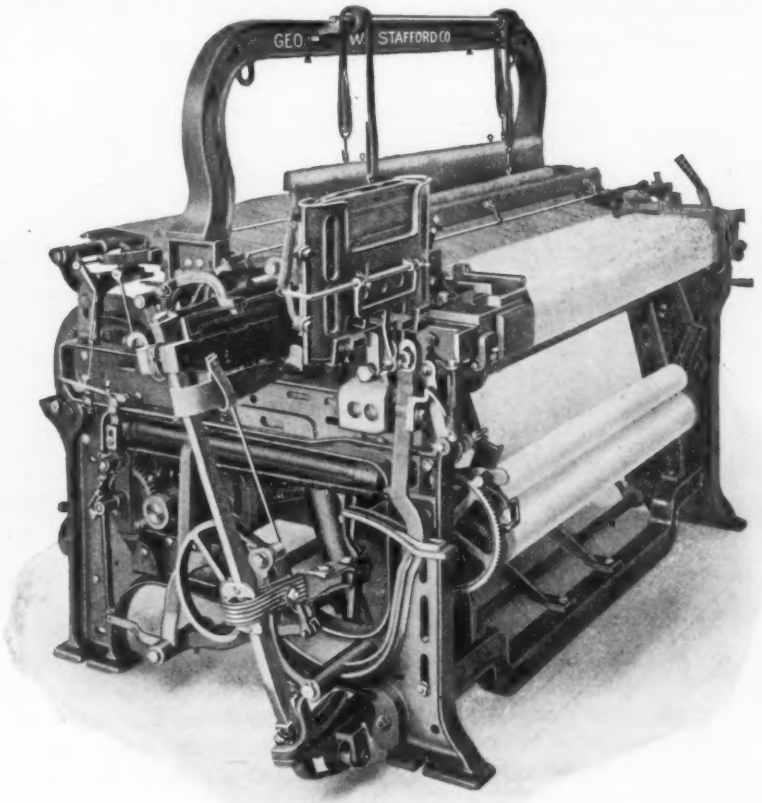
The machine can be controlled from either end and is semi-automatic. The vertical movement is controlled by cams which make it impossible for the top platen to drop even in case of accident. A very desirable feature of the machine is the location of the operating and timing mechanisms far enough from the platen to prevent water and dirt from getting into the wearing parts. The bearings for the main parts are of bronze and adjustable for wear as are also the connecting rod and link bearings.

Further information regarding this machine can be obtained upon application to the builders, the Farrel Foundry and Machine Co., Ansonia, Conn.

The German government assesses import duties on cotton yarn by the English system in order to make German custom house practice conform to the practice in German mills.

THE G. W. STAFFORD CO.'S AUTOMATIC LOOM.

The Geo. W. Stafford Company, of Readville, Mass., has recently introduced what promises to be a valuable improvement in automatic weaving. Realizing that for years the great demand has been for a simple and comparatively inexpensive automatic loom, this company brought an experience of over twenty-five years to bear upon the subject and believes that the loom it now offers combines all the desirable features.



THE STAFFORD AUTOMATIC LOOM.

The base of this automatic loom is the Stafford model plain loom which is now being used by so many manufacturers. To this loom has been added a very simple shuttle changing device which operates only when for any reason the filling is to be replenished. The loom then stops, the empty shuttle is ejected, a new one is substituted and the

loom starts off again exactly as if under the control of a weaver. Thus to all intents and purposes it becames a plain loom, and cop or bobbin filling can be used indiscriminately.

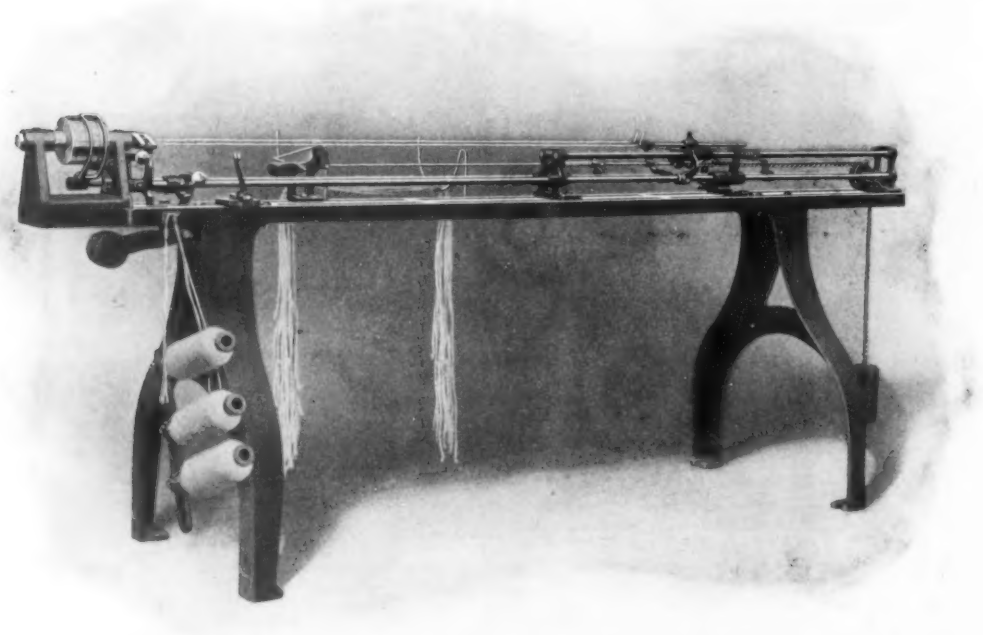
It is claimed a grade of cloth is woven on this loom superior to any yet made by an automatic loom. The automatic shuttle changing device is extremely simple and does not in any way conflict with the operation of the loom, as it is only called into use when the filling breaks or runs out. When it has done its work the changing device is put out of action. The fixing and repairs thus do not exceed those of any plain loom and ordinary mill supplies can be used. The importance of these features will readily be appreciated by those who experience trouble in securing weavers and fixers, or who have been using complicated looms calling for special and expensive repair parts.

It is stated that in mills where these looms are in use a weaver runs from twenty-six to thirty looms with a 92 1/2 per cent. production and practically no seconds.

Further information relative to these looms may be obtained by addressing the Geo. W. Stafford Company, Readville, Mass.

THE NEW DRAPER BANDING MACHINE.

An entirely new model of banding machine, incorporating many interesting features, has recently been designed and built by the Draper Co., Hopedale, Mass. The original construction has been the standard trade machine for making spinning and twisting bands for about twenty years. The general principle and construction is so well known that it is hardly necessary to explain the detail. It is semi-automatic in action, changing from twisting to doubling, and stopping itself when the band is done. It can be set so as to get any desired amount of twist, making either a hard or soft band. The twist will always be uniform. It can be run by a boy, and often obtains a product of 1,500 bands a day. It is usually run at a speed of about 2,000 revolutions.



THE DRAPER BANDING MACHINE.

The use of roving as a material is preferred

by some, though many mills use twisted yarn, and some run in a core of twine or linen thread. Some years ago the Draper Co. introduced the Watters marking attachment with great success, for the purpose of showing the band boy where the knot should be tied. With this means an even tension can be had on all spindles. This attachment is included with the present machine without additional cost, and a more expensive and highly improved machine in other details is furnished at the same price formerly charged for the banding machine without the Watters attachment.

The new machine is built with an iron frame, having no wood whatever in its construction. It is supplied with an automatic brake, acting on a drum near the belt pulley. The hooks are of new shape to aid in quick manipulation. The Watters marker has an interrupted return motion to prevent spattering the ink. A neat holding device is supplied to enable the operative to prepare a new band for attachment while a band is being twisted. The knife is easily removed for sharpening. The shipper handle is put in a more convenient position. There is a new style of holder for made bands. A chain is furnished, instead of letting the mill use a cord for the weight, and the weight itself is furnished with a grab hook, which engages the chain at any desired position, the extra chain coiling in a hollow in the weight. The band hook slide has a marked scale so that bands may be made to a definite length. The holder for the roving bobbins is adjustable to various positions.

EXPOSITION AT TOURCOING.

We have received notice of the forthcoming textile exposition to be held from May to September, 1906, at Tourcoing, France. It states the unquestionable fact that world's fairs are so large as to defeat the purpose for which they are organized. The tendency now appears to be toward smaller expositions confined to special industries. Tourcoing is the centre of a very important textile district, which includes such cities as Roubaix, Lille and Armentieres. These cities alone have a population of 2,000,000, and the exposition will be within easy reach of the important textile districts of Belgium and France. The circular further states that efforts are being made to have the exposition thoroughly representative of the textile industry. Further information regarding the enterprise can be obtained from E. O. Lami, 12 rue Pasteur, Enghien, Belgium.

INTERESTED IN FIBRES.

Havana, Cuba, April 11, 1905.

Editor Textile World Record:

Colonel Haskell, of the Haskell-Dawes Machine Co., Boston, Mass., has been spending about a week here looking into the cultivation of henequen and ixtle and other fibrous plants. He found that there was plenty of land in Cuba too poor for either tobacco or sugar, which could be given over to these plants. With some other gentlemen, who are also interested in the cultivation of these fibres, he made several trips into the country and was shown methods by which the fibres could be successfully cultivated here. Cuba has a better climate than either Yucatan or Mexico, where these plants are grown to such a large extent, and the fibre produced here is generally longer and of a finer quality.

Col. Haskell is interested in a company that has established a rope and cordage plant in Mexico, in connection with which they have about 18,000 acres of henequen and ixtle under cultivation. He intends to return to this country in the course of a few months to organize a company for the cultivation of henequen and ixtle in Cuba and also establish a plant for the manufacture of rope and cordage from the product.

L. MACLEAN BEERS.

RETTING FLAX.

Editor Textile World Record:

Since the publication of my article on flax in the March number of the Textile World Record, I have had a conversation with Mr. J. Doull Miller of New York, and learn that the Loppens system of tank retting has been established at Northfield, Minn., and will be used not only for the retting of flax but of hemp. Some samples of hemp shown me, produced by this process, were very fine.

CHAS. RICHARDS DODGE.

Washington, D. C., April 17, 1905.

Dyeing, Bleaching, Printing, Etc.

INDIGO PRINTING WITH HYDROSULPHITE.

The use of this process enables the printer to secure all shades of blue from the very lightest to the heaviest upon cloth that has not been previously prepared. On the other hand, if the cloth used has been prepared with beta naphthol, the indigo can be combined with insoluble azo colors. On Turkey Red grounds superior discharge effects are obtained, while the clear hydrosulphite paste, without any indigo, completely discharges the Turkey Red to a clear white.

PREPARATION OF THE PRINTING PASTE.

The Hydrosulphite N F is dissolved in hot water and allowed to cool. When cold, it is added gradually to the alkaline thickener contained in a jacketed pan, after which the indigo paste is thoroughly stirred in. British gum, free from starch, is the best thickening agent for dark shades, and when mixed with the alkali should produce a perfectly smooth and clear paste. Light shades are best thickened with gum arabic. The caustic soda solution should stand at 76 deg. Tw., at which strength the indigo is exhausted without undue action on the cotton.

In making reductions of heavy shades, the reducing paste should be gum arabic containing a small quantity of glycerine and some hydrosulphite.

It is possible to prepare light shades using pastes containing an increased quantity of hydrosulphite, but no alkali. When using naphthol prepared cloth, care should be taken that the prepare be as free from oil as possible.

PRINTING.

The colors should flow freely, not too thick, but the consistency should be regulated by the character of the design and the depth of the engraving on the shells. For multicolored effects, each shell ought to be supplied with two doctor blades.

After printing the cloth must be evenly and thoroughly dried before going into the steam box.

STEAMING.

This is the most important part of the entire process, as the success of the printing depends wholly upon it. The temperature should be from 212 to 216 deg. F., and the chamber be absolutely free from air, as the oxygen which would then be present impairs the results. From two to three minutes are usually sufficient for any one portion of the goods to be in the steam.

A Mather-Platt steamer is well adapted for this operation, and by regulating the amount of steam inside, no air can gain entrance through the slits, and to use up the air already in the steamer when starting, always use an end cloth saturated with hydrosulphite. Control of the temperature should not be left to guess work, but frequent reference to a thermometer ought to be made.

WASHING AND FINISHING.

A good supply of running water through the washing machine is necessary so as to avoid any possibility of the blue bleeding into adjacent white, and of course it is necessary that the fabrics be washed at full width, not only to prevent bleeding, but to ensure the removal of all traces of alkali.

The depth of water in the machine should be so low that a fair proportion of the goods will be exposed to the air, which will materially aid in fixing the color. After a thorough washing and oxidizing in the broad washer, the goods are finally washed in rope form in a soap washer for ten minutes at a temperature of 140 degrees.

FORMULÆ.

The following formulae are the results of actual practice and will serve to assist in working out the details of this interesting process with indigo, and by indigo is meant the technical, and not the natural product.

NAPHTHOL GROUND.

Beta Naphthol	1½	parts
Caustic Soda Solution, 36° Tw..	3	parts
Hot Water	20	parts
Cold Water	60	parts

Para Soap	1½ parts
Water to make	100 parts

ALKALINE GLYCERINE REDUCING PASTE.

Gum Solution (1 : 2)	40 parts
Caustic Soda Solution, 76° Tw.	50 parts
When cold, add	
Glycerine	1½ parts
Hydrosulphite (Hoechst)	1 part
Water	75 parts

NEUTRAL REDUCING PASTE.

Hydrosulphite	10 parts
Water	30 parts
Thickened with	
British Gum (1 : 1)	60 parts

STEAM INDIGO BLUE PASTE.

Hydrosulphite	1½ parts
Hot Water	½ part
Alkaline British Gum Thickening (see below)	4½ parts
Indigo M L B, 20% paste	1½ parts
Mixed with	
Cold Alkaline British Gum Thickening	20 parts

ALKALINE BRITISH GUM THICKENING

is made as follows:

British Gum (free from Starch)	10 parts
Caustic Soda Solution, 76° Tw.	90 parts

Dissolve at 122° to 140° F. until a clear solution results.

AZOPHOR RED PRINTING PASTE.

This paste is always applied upon a cloth that has been prepared with Beta Naphthol, and is made as wanted in the following manner:

Azophor Red P N	9 parts
Dissolved in	
Cold Water	34 parts
Then add	
Tragacanth Paste (60 : 1000)	50 parts
Acetate of Soda	3 parts
Nitrate of Ammonia Crystals	4 parts

The advantages possessed by using the artificially produced indigo are many, perhaps the most important being its freedom from the many impurities that are always found in even the best grades of natural indigo. At one time, and not so many years ago, there was an opinion somewhat prevalent that this then unusual purity would yield results and shades that could not be made use of, but as the good qualities of the product became better known, the "new indigo" gained favor, until now but little of the real vegetable indigo finds its way into scientifically conducted print works.

For all classes of indigo printing it is so far superior to the ordinary substance that when once used it is never discarded. Technically its fine state of division lends itself to easy reduction, and consequently it is free from the well known annoyance of the ancient grinding operation.

THE DYEING OF HALF WOOLS.

Commercial conditions and the character of the goods the manufacturer has in view are both instrumental in determining the class of raw material going into a fabric. The comparatively high price of pure wool has been the means of developing the half-wool industry to such an extent that the majority of cloth makers have favorably considered the use of these mixed fibres.

At one time the dyeing of this material was done with mixtures of acid and basic colors, but since the direct colors have been brought to their high degree of usefulness, they have largely displaced the older colors, and the one prime cause is that the direct colors can be used on almost all classes of mixed goods from one bath, and in one operation.

The use of a one-bath method is not to be recommended for all kinds of dyeing, for the reason that there are limits to which the dyer can go in producing uniform effects. Certain goods have warp and filling of two widely differing raw materials, so the dyer should consider beforehand just the range of shades possible, and select his colors accordingly.

The use of the direct colors has the advantage that they are taken up by the cloth much slower than the acid colors, and that by regulating the temperature of the bath, more or less can go on the wool or cotton as the opposite fibre takes up its color fast or slow.

A very good one-bath method giving excellent results consists of dyeing the cotton black during the milling process, which is

conducted cold, and it obviates the subsequent covering in a strongly acid bath. The following description of the process is based upon a batch of cloth weighing 300 pounds:

The milling solution is prepared in the usual manner, and to it are added 25 gallons of soda solution, and about 5 pounds of direct black (of the tetrazo or substantial group). Then give from 2 to 2 1/2 hours' milling, and afterwards sufficient Glauber's salt solution to ensure the complete exhaustion of the dye. The Glauber's salt solution is made as strong as possible, and is added during the last half hour of the milling. This method dyes the cotton almost a full shade, while at the same time the wool is protected by the alkalinity of the bath, which by the way is not of such a character as to injure it, and has the further advantage of being worked cold.

The quantity of black indicated above is to be varied as the amount of cotton in the mixture is above or below the normal quantity of 50 per cent.

Subsequent dyeing of the wool is always done by dyeing in baths of acid colors that can be best applied from baths feebly acid, or acidified with acetic acid.

The ordinary one dip bath, wherein dyes are used consisting of mixtures of acid and direct colors, possesses many advantages, but where the stock used is of doubtful origin, or where it is known that the wool in the mixture has once been extracted no certainty can be put upon the quality of the resulting shades, as the direct color in the mixture is very likely to suffer decomposition during dyeing, unless the material to be dyed is treated beforehand with very great care and thoroughness.

DYEING SHODDY.

Shoddy as a rule is made from old garments and previously used textile fabrics of all kinds, and differs from mungo in that this latter article has never been previously worked up into wearing apparel. Generally shoddy contains from 30 to 40 per cent. of cotton, and the better grades are reworked into fair grades of cloth that contain a cotton warp and are used for clothing. Inferior qualities are used for other grades of cloth, and also have a large outlet in the manufacture of fabrics that are not used for clothing. In the treatment of this raw material the rags are sorted into various colors which can remain as such, for instance greens, reds, blues, browns, etc., and those other nameless shades, vari-colored, faded or which of necessity require redyeing. Light colored rags, however, can be dyed heavy colors if rags previously dyed with those same colors are not at hand in quantities sufficient to make up a batch of the desired weight.

Rags of nearly the same color are to be sorted carefully, and set aside, so that the expense of redyeing can be saved. From a sanitary point of view it may be remarked that the sorting of rags made from previously worn clothing is not the most healthful occupation on account of the dust and dirt that are always present, but another source of unpleasantness of perhaps a dangerous character is likewise present, namely: possible infection with disease germs. Every precaution should be taken to disinfect thoroughly before being sorted all shipments of rags intended for shoddy manufacture.

The sorted rags should now be thoroughly washed, and the following details of this process may be of interest to the readers: Soak in a bath of ammonia or sal-soda at a temperature not exceeding 145 deg. F., and for about three-quarters of an hour, finally wring or pass through squeeze rollers and rinse. So-called Wyandotte soda has been found to give good results in treating rags and its action is such as to lessen any possible chance of the goods becoming harsh. If ordinary soda is used, see that the rags are wrung out quickly and rinsed and immediately after the soaking, otherwise there is danger of their becoming weak and tender.

Should it be necessary to redye rags that are already dark color, they must first be discharged as much as possible by means of an alkaline treatment consisting of soaking at a temperature of about 180 degrees in a bath containing about 6 per cent. ammonia or 2 1/2 per cent. of soda, the latter chemical, however, is not nearly so efficient.

The washed material is now graded into loose and close pieces, the former being dyed directly, but the latter is put through a gar-

nett machine which tears them into shreds, thereby enabling the dyeing liquors to penetrate more thoroughly.

Methods of Dyeing.—Three processes of dyeing are available for this class of material, the most important of which is by means of direct dyeing colors in one bath. The next process which finds limited application depends upon the use of basic dyes, and consists of three distinct operations, viz.: preliminary treatment with sumac, fixation with a soluble salt of antimony and the dye. The third method finds only restricted application and uses both acid and basic dyes in four baths, in the following order: an acid bath for wool, then rinse, give three baths for the cotton consisting of the sumac mordanting, antimony fixing, and the color. The two latter methods require a great amount of labor, but they possess an advantage of yielding the brightest shades, which are unfortunately not over fast to washing. This latter disadvantage prevents their use for a number of purposes, but they can be used for curtains, table cloths and all fabrics that must be brilliant in appearance and which do not have to undergo washing.

The first process mentioned and certainly the cheapest is that requiring direct colors. This process is carried out in the following manner. Make up the dye bath with 25 pounds of anhydrous Glauber's salt to every 100 pounds of material to be dyed, then add 1/2 pound of borax, which acts in a peculiar manner, preventing the wool from taking up the color too quickly and thus producing uneven shades.

The temperature of the bath should not be allowed to go too high. The material is best entered at about 145 deg. F., raise very slowly to a few degrees below the boiling point, and keep there for thirty or forty minutes until the cotton is sufficiently dyed and then boil up gently so that the wool can be dyed.

In spite of all precautions in dyeing this material it is frequently seen that the cotton is of a lighter shade than the wool, requiring the use of colors that possess stronger affinity for the cotton than the wool, such colors are as follows: Diamine Fast Yellow A, Diamine Orange G, Diamine Brown V, Diamine Pure Blue, Oxydiamine Black S 000, Eboli Green, Columbia Blue G, Congo Fast Blue B & R, Chlorimine Yellow.

During the shading of the cotton, heating the bath should be stopped so as to prevent the wool from taking up more color. Should the wool be full enough some borax or soda should be added to the bath before the cotton is shaded.

Black on varicolor rags may be dyed with a variety of products, but every black requires a tinting with alkali or victoria blue. For deep blue, dark colored rags can be dyed with a neutral blue or violet wool dye, adding when the cotton is dyed, a suitable black for the wool, observing the precautions above mentioned.

DYEING COTTON VELVET.

These fabrics are plush cottons with an even or ribbed pile. The operations subsequent to weaving consist in shearing, raising, gassing and scouring. In most cases the unbleached fabric can be used, but it must be bleached for dyeing delicate shades. The bleaching is easily done with a dilute solution of chloride of lime, but the after rinsing must be thoroughly done. Some bleachers do this rather perfunctorily with the result that the fabric is tendered, and tears very easily both warpwise and weftwise.

After bleaching or scouring, as the case may be, the goods are ready for dyeing. Having regard to the fact that the materials here dealt with are pure cotton, it is obvious that any cotton dye may be used for dyeing them, and by the processes adaptable to cotton in general. At the same time the choice among the cotton dyes is a very different matter, and requires great experience in this particular branch of dyeing. Take first the substantive dyes. These give on the fabrics in question dull shades. If we look straight down upon the pile, the shade looks deeper than on ordinary cotton fabrics, but if, on the other hand, we look slantingly, the shade at once assumes a tinge of gray. This curious circumstance excludes a large number of the current substantive dyes from cotton velvet dyeing. The difficulty is particularly great with black. The substantive blacks, even when eight to ten per cent. of the dye is used, give the gray shade when the fabric is

viewed sideways. The sulphur dyes do not give perceptibly better results, and even diazotizing and developing will not give satisfactory results in unskilled hands.

Color Cards.

Level Dyeing Colors on Ladies' Dress Material; Farbenfabriken of Elberfeld Co., 40 Stone St., New York City.

An elaborate folder showing 60 samples of ladies' dress goods dyed with level dyeing colors. The samples show a great variety of shades and material and complete dyeing directions are given for each. A percentage table of the quantity of color necessary for each one hundred pounds of goods is also given.

Chlorazol Blue: Read Holliday & Sons, 7 Platt St., New York City.

A card showing thirty samples of loose cotton, cotton yarn, sateen and flannelette, colored in thirty different shades with Chlorozol Blue dyes.

Immedial Indogene B Conc.; Cassella Color Co., 182 Front St., New York City.

Nine samples, including raw cotton, cotton yarn and piece goods showing dyeings ranging from 3 to 10 per cent. of Immedial Indogene B Conc.

Benzo Fast Red F C; Farbenfabriken of Elberfeld Co., 40 Stone St., New York City.

A card showing 3 per cent. dyeings of Benzo Fast Red F C on samples of cotton and of woolen yarn, to each of which it is equally well adapted.

DYE RECIPES.

The following recipes appear in the Dyers' Supplement, which is issued each month by the TEXTILE WORLD RECORD. The Supplement contains the colored samples, dyed according to recipes given. The selection of samples is carefully made, and it is the aim to show shades which are of especial interest to the dyer, and which the requirements of the market demand. The Dyers' Supplement is a 16-page pamphlet, in convenient form for preservation Subscription price for the Dyers' Supplement $1.00 per year

Recipe No. 65.

Scarlet on Woolen Yarn.

X L Scarlet on 100 lbs. woolen yarn. Prepare the dye bath with

3 lbs. X L Scarlet.
(Read Holliday & Sons, Ltd., 7 Platt St., New York.)
10 lbs. Glauber's Salt.
3 lbs. Sulphuric Acid.

Enter yarn at the boil and dye boiling for half an hour.

X L Scarlet possesses excellent leveling and penetrating powers and is a very bright and desirable shade.

Recipe No. 66.

Black on Worsted Yarn.

Acid Alizarine Black 4 S on 100 lbs. worsted yarn. Prepare the dye bath with

5 lbs. Acid Alizarine Black 4 S.
(Walter F. Sykes & Co., 85 Water St., New York.)
4 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter yarn at 180° F. and dye at a boil for one hour.

Acid Alizarine Black 4 S is a new fast black producing shades of excellent fastness to washing, milling and light. It penetrates well and is particularly desirable for the dyeing of heavy felts and piece goods.

Recipe No. 67.

Blue on Cotton Yarn.

Immedial Indogene B Conc. on 100 lbs. cotton yarn. Prepare the dye bath with

First Bath.

20 lbs. Immedial Indogene B Conc.
(Cassella Color Co., 182 Front St., New York.)
40 lbs. Sodium Sulphide Crys.
10 lbs. Glucose.
5 lbs. Soda Ash.
1 lb. per 10 gallons liquor Glauber's Salt.

Standing Bath.

10 lbs. Immedial Indogene B Conc.
(Cassella Color Co., 182 Front St., New York.)
18 lbs. Sodium Sulphide Crys.
5 lbs. Glucose.
1 lb. Soda Ash.

Dye for one hour at a temperature of 195° F., s[illegible]eeze and rinse, and age after dyeing.

Immedial Indogene B Conc. gives dyeings that are very fast to light, and the other common color destroying agents.

Recipe No. 68.

Pink on Bleached Cotton Yarn.

Brilliant Direct Red B on 100 lbs. bleached cotton yarn. Prepare the dye bath with

3 oz. Brilliant Direct Red B.
(Edwin M. Thayer & Co., 112 Broad St., Boston.)
10 lbs. Common Salt.

Enter yarn at boil and dye at a boil for one hour.

Brilliant Direct Red B produces exceedingly bright shades of pink which are fairly fast to sunlight, and particularly fast to washing.

Recipe No. 69.

Black on Cotton Yarn.

Sulphur Black 4 B Extra on 100 lbs. cotton yarn. Prepare the dye baths as follows:

First Bath.

10 lbs. Sulphur Black 4 B Extra.

(Berlin Aniline Works, 215 Water St., New York.)
30 lbs. Sodium Sulphide.
25 lbs. Sal Soda.
2 lbs. Caustic Soda (Solid).
100 lbs. Common Salt.

Second Bath.

7.5 lbs. Sulphur Black 4 B Extra.
(Berlin Aniline Works, 215 Water St., New York.)
15 lbs. Sodium Sulphide.
15 lbs. Sal Soda.
6.5 oz. Caustic Soda (Solid).
20 lbs. Common Salt.

Third and Standing Bath.

6 lbs. Sulphur Black 4 B Extra.
(Berlin Aniline Works, 215 Water St., New York.)
13 lbs. Sodium Sulphide.
6 lbs. Sal Soda.
6.5 oz. Caustic Soda (Solid).
Common Salt, enough to keep bath at 85° Tw.

Enter cotton well opened and keep below the surface of the liquor.

Dye one hour just below the boil, then raise, allow to drain well, rinse in running water until it comes perfectly clear.

Sulphur Black 4 B Extra possesses excellent fastness to light, washing, and acids.

Recipe No. 70.

Blue on Cotton Yarn.

Diamineral Blue C V on 100 lbs. cotton yarn. Prepare the dye bath with

4 lbs. Diamineral Blue C V.
(Cassella Color Co., 182 Front St., New York.)
30 lbs. Common Salt.
1 lb. Soda Ash.

Enter at 170° F. and dye at a boil for one hour. An after treatment in a bath made up with

3 lbs. Copper Sulphate,
3 lbs. Acetic Acid

renders the shade produced somewhat faster.

Diamineral Blue C V gives a full shade of navy blue.

Recipe No. 71.

Orange Red on Worsted Yarn.

Alizarine Orange O n 100 lbs. worsted yarn. Prepare the dye bath with

3 lbs. Alizarine Orange O.
(American Dyewood Co., 156 William St., New York.)
5 lbs. Acetic Acid.

Enter yarn into the cold bath, bring to a boil and dye at a boil for thirty minutes, then add

2 lbs. Sulphuric Acid

to exhaust the dye bath. Boil twenty minutes longer to exhaust the dye bath, then add

1½ lbs. Potassium Bichromate

and boil twenty minutes longer.

Alizarine Orange O possesses excellent fastness to light and milling, and is recommended for work where the ordinary acid oranges are not fast enough.

Recipe No. 72.

Slate on Worsted Yarn.

Domingo Alizarine Blue R on 100 lbs. worsted yarn. Prepare the dye bath with

1 lb. Domingo Alizarine Blue R.
(C. Bischoff & Co., 88 Park Pl., New York.)
15 lbs. Glauber's Salt.
4 lbs. Sulphuric Acid.

Enter at 140° F. and dye at a boil for one hour, or until the bath is practically exhausted, then aftertreat for one-half hour in the same bath, to which

2 lbs. Potassium Bichromate

has been added.

Domingo Alizarine Blue R will be found to be excellent for the production of fast slates and drabs.

Recipe No. 73.

Blue on Worsted Yarn.

Fast Chrome Violet B W on 100 lbs. worsted yarn. Prepare the dye bath with

3½ lbs. Fast Chrome Violet B W.
(C. Bischoff & Co., 88 Park Pl., New York.)
15 lbs. Glauber's Salt.
4 lbs. Sulphuric Acid.

Enter at 150° F. and dye at a boil one hour or until bath is practically exhausted of color, then after treat in a bath made up with

2 lbs. Potassium Bichromate

for one-half hour at a boil.

Fast Chrome Violet B W gives very fast dyeings of a reddish shade of blue.

Recipe No. 74.

Black on Cotton Yarn.

Sulphide Black 3 B on 100 lbs. cotton yarn. Prepare the dye bath with

12 lbs. Sulphide Black 3 B.
(Edwin M. Thayer & Co., 112 Broad St., Boston.)
35 lbs. Sodium Sulphide.
4 lbs. Alkali 58 per cent.
30 lbs. Common Salt.

Dissolve color and sodium sulphide in boiling water, and add to the dye bath, in which the alkali has been previously dissolved, raise temperature of the bath to 190° F., enter yarn, give two turns, and put in the required amount of salt. Raise to boil and dye at a boil until the desired fullness is attained.

Of the above amounts, for standing kettle use one-half the quantity of dyestuff, one-third sodium sulphide, and one-fourth each of alkali and salt.

Sulphide Black 3 B possesses the excellent fastness characteristic of the sulphur colors.

Recipe No. 75.

Yellow on Bleached Cotton Yarn.

Rhoduline Yellow 6 G on 100 lbs. bleached cotton yarn. First mordant the yarn with

4 lbs. Tannic Acid,
fixing the same with
2 lbs. Tartar Emetic.

Then dye in a bath made up with

1¼ lbs. Rhoduline Yellow 6 G.
(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)
2 lbs. Acetic Acid,

and dye ¾ of an hour at 140° to 160° F.

Rhoduline Yellow 6 G gives clear shades of yellow fast to washing and ironing.

Recipe No. 76.

Blue on Cotton Yarn.

Chlorazol Blue 8 B on 100 lbs. cotton yarn. Prepare the dye bath with

2 lbs. Chlorazol Blue 8 B.
(Read Holliday & Sons, Ltd., 7 Platt St., New York.)
5 lbs. Oleine Oil.
10 lbs. Glauber's Salt.

Heavier shades are made with the addition of

25 lbs. Glauber's Salt

and

2½ lbs. Soap.

The material is entered slightly below the boil, given a few turns, then the bath is quickly raised to a boil, and boiling continued for half an hour.

Recipe No. 77.

Brown on Cotton Yarn.

Meridian Fast Brown G G on 100 lbs. cotton yarn. Prepare the dye bath with

2 lbs. Meridian Fast Brown G G.
(F. E. Atteaux & Co., 174 Purchase St., Boston.)
20 lbs. Common Salt.

Wet out material and enter into dye bath at a temperature of 120° F., bring slowly to the boil and dye at a boil for one hour. Lift goods, wash and dry.

Meridian Fast Brown G G will dye union goods with the addition of Glauber's salt. It is a very level dyeing color and can therefore be used to advantage with other direct or union colors.

Recipe No. 78.

Violet on Worsted Yarn.

Acid Violet 4 R Conc. on 100 lbs. worsted yarn. Prepare the dye bath with

2 lbs. Acid Violet 4 R Conc.
(American Dyewood Co., 156 William St., New York.)
4 lbs. Sulphuric Acid.
15 lbs. Glauber's Salt.

Enter at 170° F. and dye at a boil for one hour.

Acid Violet 4 R Conc. is a very level dyeing color. It will not stain white cotton in cross dyeing, and possesses good fastness to light.

Recipe No. 79.

Drab on Cotton Yarn.

Thionol Brown O on 100 lbs. cotton yarn. Prepare the dye bath with

1 lb. Thionol Brown O.
(Thomas Leyland & Co., 53 India St., Boston.)
2 lbs. Sodium Sulphide Crystals.
20 lbs. Glauber's Salt.

Enter at 180° and dye at the boil for one hour.

Thionol Brown O will be found most useful in the production of fast drabs and mode shades. It possesses excellent fastness and all the good qualities of the sulphur colors. It is well suited to the dyeing of corduroys and pile fabrics.

Recipe No. 80.

Blue on Cotton Yarn.

Thiogene Dark Blue B T L on 100 lbs. cotton yarn. Prepare the dye bath with

First Bath.

10 lbs. Thiogene Dark Blue B T L.
(H. A. Metz & Co., 122 Hudson St., New York.)
15 lbs. Sodium Sulphide Crys.
4 lbs. Sodium Carbonate.
2½ lbs. Caustic Soda 40° Bc.
35 lbs. Common Salt.

Second Bath.

7½ lbs. Thiogene Dark Blue B T L.
(H. A. Metz & Co., 122 Hudson St., New York.)

7½ lbs. Sodium Sulphide Crys.
2 lbs. Sodium Carbonate.
1½ lbs. Caustic Soda 40° Be.
10 lbs. Common Salt.

Third and Following.

7 lbs. Thiogene Dark Blue B T L.
(H. A. Metz & Co., 122 Hudson St., New York.)
7 lbs. Sodium Sulphide Crys.
1½ lbs. Sodium Carbonate.
1 lb. Caustic Soda 40° Be.
5 lbs. Common Salt.

The dyestuff is dissolved with the sodium sulphide in hot water and then added to dye bath containing the other ingredients.

The dyeing is carried out at a temperature just below the boil for one hour.

After dyeing the yarn is hydro extracted and allowed to lie for several hours or developed by steaming for ½ hour with the addition of air. The caustic soda is not absolutely necessary when the color is developed by steaming.

Thiogene Dark Blue B T L is well suited to the dyeing of all classes of cotton goods, and possesses the excellent fastness characteristic of the sulphur colors.

(Proceedings of the New England Cotton Manufacturer's Association, continued from Page 99.]

A New Classification of Color.

BY A. H. MUNSELL, Boston, Mass.

There is no practical color system in general use today. Each occupation has devised different methods, so entirely at variance that it is quite impossible to translate the color terms of one trade or art into those of another occupation.

Art and industry are familiar with pigments such as vermilion, madder, sienna, umber and cadmium, while chemistry uses another set of terms, based on the proportions of dye-stuffs, or numbered arbitrarily. Thus the same color is known as 2,309 upon one card and 7 1/2 on another, and these numbers change from season to season.

The incongruous and bizarre nature of our present color names must appear to any thoughtful person. Baby blue; peacock blue, Nile green, apple green, lemon yellow, straw yellow, rose pink, heliotrope, royal purple, magenta, solferino, plum and automobile are popular terms, conveying different ideas to different persons but utterly failing to define colors. The terms used for a single hue, such as pea green, sea green, olive green, grass green, sage green, evergreen, invisible green, are not to be trusted in ordering a piece of cloth. They invite mistakes and disappointment. Not only are they inaccurate: they are inappropriate. Can we imagine musical tones called lark, canary, cockatoo, crow, cat, dog, or mouse, because they bear some distant resemblance to the cries of those animals?

Music is equipped with a system by which it defines each sound in terms of its pitch, intensity, and duration, without dragging in loose allusions to the endlessly varying sounds of nature. So should color be supplied with an appropriate system, based on the hue, value, and chroma of our sensations and not attempting to describe them by the indefinite and varying colors of natural objects. The system now to be considered portrays the three dimensions of color and measures each by an appropriate scale. It does not rest upon the whim of an individual, but upon physical measurements made possible by special color apparatus. The results may be tested by any one who comes to the problem with "a clear mind, a good eye, and a fair supply of patience."

The three color quantities are hue, value, and chrome.

HUE IS THE NAME OF A COLOR.

Hue is the quality by which we distinguish one color from another, as a red from a yellow, a green, a blue, or a purple. This names the hue, but does not tell whether it is light or dark, weak or strong—leaving us in doubt as to its value and its chroma.

Science attributes this quality to difference in the length of ether waves impinging on the retina, which cause the sensation of color. The wave length M. 5,269 gives a sensation of green, while M. 6,867 gives a sensation of red.

VALUE IS THE LIGHT OF A COLOR.

Value is the quality by which we distinguish a light color from a dark one. Color values are loosely called tints and shades, but the terms are frequently misapplied. A tint should be a light value, and a shade should be darker; but the word "shade" has become a general term for any sort of color, so that a shade of yellow may prove to be lighter than a tint of blue. A photometric scale of value will place all colors in relation to the extremes of white and black, but cannot describe their hue or their chroma.

Science describes this quality as due to difference in the height or amplitude of ether waves impinging on the retina. Small amplitudes of the wave lengths given above, produce the sensation of dark green and dark red: larger amplitudes give the sensation of lighter green and lighter red.

CHROMA IS THE STRENGTH OF A COLOR.

Chroma is the quality by which we distinguish a strong color from a weak one. To say that a rug is strong in color gives no hint of its hues or values, only its chromas. Loss of chroma is loosely called fading, but this word is frequently used to include changes of value and hue. Take two autumn leaves, identical in color, and expose one to the weather, while the other is waxed and pressed in a book. Soon the exposed leaf fades into a neutral gray, while the protected one preserves its strong chroma almost intact. If, in fading, the leaf does not change its hue or its value, there is only a loss of chroma, but the fading process is more likely to induce some change of the other two qualities. Fading, however, cannot define these changes.

Science describes chroma as the purity of one wave length separated from all others. Other wave lengths, intermingling, make its chroma less pure. A beam of daylight may combine all wave

lengths in such balance as to give the sensation of whiteness, because no single wave is in excess.

THREE DIMENSIONS NEEDED TO DEFINE A COLOR.

The omission of any one of these three dimensions leaves us in doubt as to the character of a color, just as truly as the character of this studio would remain undefined if the length were omitted and we described it as 22 feet wide by 14 feet high. The imagination would be free to ascribe any length it chose, from 25 to 100 feet. This length could be conceived differently by every individual who tried to supply the missing factor.

Much popular misunderstanding color is caused by ignorance of these three dimensions, or by an attempt to make two dimensions do the work of three.

Flat diagrams showing hues and values, but omitting to define chromas, are as incomplete as would be a map of Switzerland with the mountains left out, or a harbor chart without indications of the depth of water. Measuring instruments discover that pigments are very unequal in this third dimension—chroma—producing mountains and valleys on the color sphere, so that, when the color system is worked out in pigments and charted, some colors must be traced well out beyond the spherical surface. Indeed, a color tree is needed to display by the unequal levels and lengths of its branches the individuality of pigment colors. But, whatever solid or figure is used to illustrate color relations, it must combine the three scales of hue, value, and chroma, and these definite scales furnish a name for every color, based upon its intrinsic qualities, and free from terms purloined in other sensations, or caught from the fluctuating colors of natural objects.

COLOR CHARTS, AND A COLOR CODE.

The practical application of this measured color system is supplied in a convenient color atlas, i e., a set of charts, displaying an orderly arrangement, so that any kind and degree of color is defined and recorded with ease.

Horizontal sections of the color solid display a single level of colors, and are numbered from 0 (black) to 100 (white).

Vertical sections display a single hue at every level, and are indicated by initials with ten subdivisions of each hue.

Inclined sections give a series of spectra, from the palest to the darkest.

All these charts, and the hundreds of colors which they bear, are exactly classified by this decimal system. The five color initials with nine numerals furnish a code, by which any color may be telegraphed to any part of the world. Manufacturers adopting this system, can thus clearly express their color ideas to others, can draw contracts, and if need be, defend them legally.

The short time allotted to this subject makes it necessary to defer the discussion of other practical points which are more fully treated elsewhere, and sum up the advantages of such a new classification of color as is here outlined.

1. Loose and unrelated color terms are replaced by a definite notation.
2. Each color names itself by its degree of hue, value and chroma.
3. Each color can be recorded and transmitted by a code.
4. Color contracts can be drawn, and proved by physical tests.
5. New colors in no way disturb the orderly classification, as a place is already awaiting them.
6. Fading can be defined and plotted at certain intervals, showing its progress in terms of hue, value and chroma.

In the discussion that followed Henry G. Hartshorne, of the Arlington Mills, and Charles W. Dennett, of South Hadley Falls, Mass., expressed the belief that Prof. Munsell's color scheme would prove of value to the textile industry, especially to the textile designers. At this and the succeeding sessions the following papers were read:

Motor Drive as Applied to Cotton Mills.

BY MELDON H. MERRILL, Boston, Mass.

To those unfamiliar with electrical apparatus, there is a general feeling that the entire subject is still enveloped in mystery and unsuited for practical operation; in fact, but little understood even by those engaged in its manufacture. Even after a careful study of some of the technical publications, the impression still remains, and in may cases the reader is more confused than before. This, however, is due entirely to the character of the literature at hand. Unfortunately, there is a woful lack of the proper kind of information in printed form that is suitable for the practical mill man. The busy agent or superintendent has neither time nor inclination to wade through the quantity of technical data and confusing terms found in even the most practical electrical publications, and owing to the lack of clear and concise information on the subject of motor drive as applied to his particular class of work, this very important and, in fact, money earning feature is given but little attention.

Manufacturers of electrical apparatus have long realized the advantages of motor drive for industrial purposes, and their own shops will be found as a rule, completely equipped with this system. The growth of the industry along other lines, however, such as traction and central station work has compelled their almost undivided attention, thus temporarily forcing the industrial problem aside. This condition, however, does not exist today and the large manufacturers are giving this problem the careful consideration and attention it demands.

It is not the purpose of this paper to go into the minute details of electric drive for cotton mill work, but rather to point out a few of the salient features which should appeal to the practical mill operator.

Industrial establishments have perhaps been somewhat slow, to adopt electric drive, due particularly to two reasons. First, electrical apparatus has been considered rather complicated and delicate. Second, the advantages to be gained have not been fully understood. Regarding the first, it would be hard to find at the present day, any power transmitting device approaching in simplicity and reliability, the alternating current induction type of

motor. As one user has aptly said, "they are as simple as a grind-stone." These motors are built of two principal parts, the stationary and the rotating elements. As usually constructed, the former receives the current from the generator through its coils which are imbedded securely in an iron core. The current passes through these coils and back to the generator without any break, forming a complete circuit. The rotating part consists of a laminated steel core provided with partially closed slots on its outer face through which insulated copper bars are passed, forming a very simple and substantial winding.

The rotating element is mounted on a shaft which is supported in bearings of large dimensions; these are the only frictional parts in the motor, there being no brushes, commutator, collector rings or moving contacts. The bearings are self-oiling and require no attention other than an occasional inspection and filling the oil reservoir.

This type of motor is very rugged in design both mechanically and electrically and is capable of carrying very heavy overloads for several hours. Motors of this type are built in sizes from a fraction of a horse power up to several hundred horse power, and can be erected on either floor, wall or ceiling, and arranged for either belt or direct drive. Such motors are started and stopped by a simple starting device which may be located at any convenient point near the motor, or at some distance as may be preferred. In some cases, all the motors on one floor are arranged to be controlled from the same station, thus allowing one operator to start quickly, the entire department.

The alternating current generator has been in use for many years and its operation and reliability are too well known to require any detailed description. It is sufficient to call attention to the fact that these generators are built for almost any speed, suitable for direct connection to either water wheels, steam engines or steam turbines. Or, they may be belt driven if preferred. Like the motors, they have a very large overload capacity and are capable of operating for many hours at considerabl above their rated output. They are constructed for various voltages or pressures, so that the question of distance between generator and motors need not be given any serious consideration. Having the generator and motor, there remains only the necessary connection between them to complete the installation. This may be divided in two parts; the switchboard controlling the generator and the various circuits or feeders, and the copper feeder wires to the various motors. The former is usually constructed of marble or slate and is located at some convenient point in the generating station. From this board, the generator is controlled and on it the various indicating and recording instruments are mounted, together with the switches controlling the several feeders. The feed wires are of either copper or aluminum suitably insulated and rigidly secured to the ceiling or wall either by insulators or a conduit system. These wires transmith the electric current from the generator to the motors and when once in place are as secure and permanent as any piping system, requiring absolutely no care or attention.

There are so many advantages to be gained by electric drive that it would be impossible to consider all of them in a paper of this character. We will, therefore, discuss only a few of the most important. There are many mills originally driven by water power, where, owing to an increase in business, additions have become necessary, and the extra power required, has been obtained by installing a steam engine, thus increasing the cost of production. By using electricity, some other power on the same or an adjacent stream could be developed, transmitting the current to the mill thus saving considerable in the operating expenses. There are also some cases where the water power available is sufficient for a part of the year, but a steam plant has to be kept in reserve for the seasons of low water. In such plants, the engines are obliged to operate at an uneven load, depending on the condition of the water power, thus giving a very poor economy in addition to the expensive and cumbersome arrangement of shafting necessary in order to make the required change from water to steam. With a steam turbine, which operates at a very uniform economy over a wide range of land, this condition would be greatly improved. In fact, the turbine presents several advantages over the steam engine, which may properly be taken up at this time.

This type of prime move, which has been in use for many years abroad, has but recently been developed in this country, and is meeting with very marked success. It is particularly adapted to drive electric generators and has been used thus far almost exclusively for this purpose. The turbine requires only a fractional part of the space occupied by the Corliss type of engine of equal output, and having no reciprocating parts, requires no foundation. In fact, any support capable of sustaining the weight of the unit, will be found adequate. This allows the condensor and other auxiliaries to be located under the turbine, thus further reducing the amount of space required and affecting a corresponding saving in the cost of the building. As no lubricant is required in the turbine, the exhaust is entirely free from oil, and the condensed water may be returned to the boiler or used for other purposes where hot water free from foreign elements is required. This feature alone is of great importance in the bleaching and dyeing departments.

The economy of the turbine at a constant load compares favorably with the best steam engineering practise of today and surpasses the latter when operating at variable loads. The generator built for turbine work is also somewhat better as regards efficiency than a machine of similar size for direct connection to a steam engine. The efficiency of the turbine outfit is therefore, considerably better than engine type outfit of similar capacity, This together with its simplicity and lack of complicated parts renders the turbine outfit particularly desirable for mill work. In cases as stated above, where it is necessary to use auxiliary steam power, the turbine fulfills all requirements. It is possible in many cases owing to its compact form, to install the unit in the existing engine room, in mills where steam and water power are both used, and, having no valves or exposed moving parts, it requires no attention or care during the period of inactivity, and is ready at a moment's notice to be thrown into service. The repairs and maintenance of this type of apparatus are very low indeed, there being little if anything to get out of order. This is very well illustrated by the recent performance of the 400 K. W.

turbine unit at the St. Louis Exposition, which operated continuously for 5 1/2 months at practically full load. On shutting down at the close of the Fair, it was examined by a committee of engineers who found absolutely no wear on any of the blades.

It is very gratifying to note that the advantages of the turbine are being recognized, and there are already quite a number of textile mills, that have in use or on order, turbine units.

Thus far the advantages considered have dealt entirely with the generating or power plant end

FIG. 1.

of the installation. Considering the mill proper and the distribution of power, the motor drive presents many features not found in any type of belt transmission. It frequently occurs that additions or extensions have to be provided; in such cases, there is a very large expense for shafting, frequently necessitating long and heavy lines which take considerable power and add materially to the friction load. By using motors for the additional power required, this shafting can be avoided and the new buildings may be located so as to obtain any advantage accruing from low cost of land or transportation facilities. The motor drive also allows a better subdivision of power, driving the various departments in proper groups and thus cutting out long lines of distributing shafting. In many cases it is possible to connect the motor direct to the main shaft of a certain group either at the end or in the center. The group drive renders a shut-down from accident to shafts or belts, practically impossible, as such trouble is confined only to one particular group, the remainder of the machines in the same department not being affected. This method also allows the various departments to be operated separately if desired, at no material loss in efficiency. It sometimes occurs that from various causes one department gets behind and over-time work is necessary. In such cases, the department to be operated, is the only one using power and there is no waste due to carrying the shafting load of the other parts of the mill, as would be the case in a mechanically driven plant.

The electric drive makes it possible to keep a very accurate record of the amount of power used and is, consequently, a check on the work of the operatives. Wattmeter readings indicate that there is a falling off of the power just before the noon hour and again just before shutting down for the night. While the electric drive does not prevent this occurrence, it at least brings it to the overseer's attention, and the proper steps can be taken to correct the loss of production.

Another advantage gained by motor drive is a more uniform speed with a consequent increase in production and fewer breaks, resulting in a better grade of goods; this is a point often overlooked in considering this system. Figs. 1 and 2 illustrate the usual type of group drive.

Before closing, the writer would like to call attention to a somewhat different type of drive than that ordinarily adopted for mill work. The foregoing has considered only the arrangement known as group drive, which thus far has been adopted in the majority of cases where electric power has been applied to either new or existing mills, and the advantages mentioned thus far have been based entirely on this type of drive. There are, however, still greater opportunities for improvement with the direct drive or direct connected arrangement as it is sometimes called. In this system, a motor is employed for each individual machine and is so arranged that it is coupled or geared to the main or pulley shaft, there being no belts or pulleys used. In this system all the advantages of the group drive are retained in addition to several others,

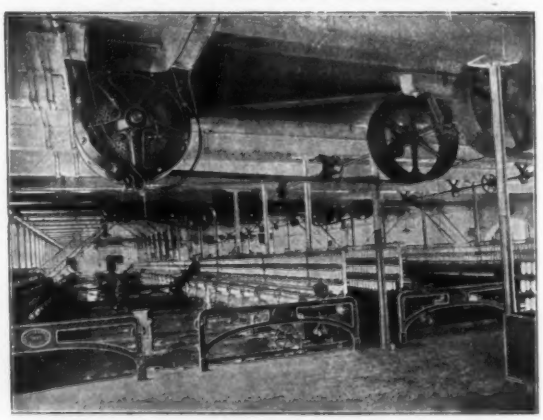


FIG. 2.

found only in the direct connected drive. One of these is the great improvement in the lighting of the mill as all belting and shafting is entirely avoided and there are no shadows either by daylight or artificial illumination. This feature alone materially improves the grade of goods, particularly in the weaving department, in mills where the shafting is located on the ceiling rather than on the floor below.

With the direct drive the shafting and belting is not required which effects quite a saving in the original installation and reduces somewhat the extra expense of installing the direct connected sys-

tem. With the absence of these parts, there is considerable saving effected in the maintenance and upkeep of the power plant, the cost for maintenance of the motors being far less than that of

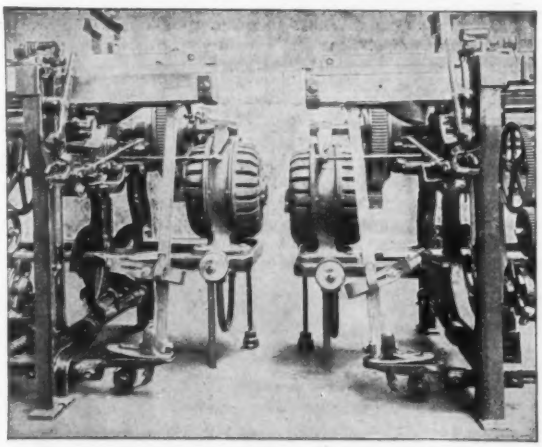


FIG. 3.

the shafting and belting. With the shafting removed, much lighter construction can be used with the same factor of safety, and a considerable saving is thus made in the building.

With the individual drive it becomes a very simple matter to determine at any time the exact condition of any machine having a large number of small moving or complicated parts, such for example as a spinning frame. By attaching temporarily a wattmeter to the circuit, the exact condition at any time can be determined, and proper repairs or adjustments made if necessary. With the belt drive, it is practically impossible to ascertain the condition of these machines and there is always some doubt as to whether or not they are operating at their proper efficiency, this feature is of considerable importance and one that should appeal strongly to the practical operator.

While these features are all important, by far the greatest gain is in the matter of production. It has been found that where the direct connected drive has been installed to replace the belt drive, that there has been an increase in production of from 5 per cent. to 7 per cent. At first this may seem rather a broad statement, but a careful consideration will make it apparent. No one questions but that with a given power to transmit, the belt offers a cheap and convenient drive. It is, however, a very variable factor in transmitting power. When new, it is put on fairly tight causing undue strain and friction on the bearings, thus increasing somewhat the amount of power required. As it is used, this condition gradually improves and a point is reached where the strains are not excessive and yet there is no slip and the power is transmitted both cheaply and efficiently.

Unfortunately, however, this condition is not permanent. As the belt continues in use, it stretches more and more and finally reaches a point where there is considerable slip and the speed of the driven shaft may be considerably less than that of the driver. This causes no reduction of power to speak of, but a marked decrease in production. This difficulty with the belt drive would not be so serious if the exact condition of each belt was known at all times, and consequently adjusted at the right moment. There is, however, no method of determining this condition quickly and cheaply, particularly where there are hundreds of such drives to be cared for. With the direct connected drive the trouble is entirely obviated. The motor operating at an absolutely uniform speed and maintaining an even constant torque at all times, thus giving a

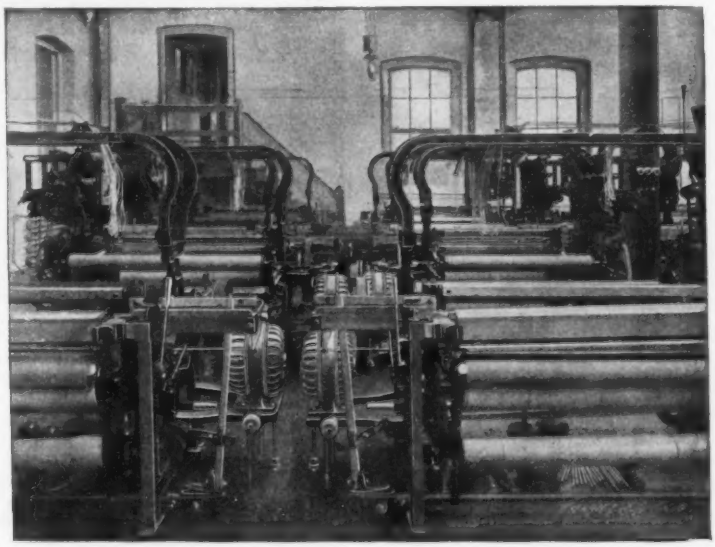


FIG. 4.

continuous and absolutely steady production. In cases of accident to the motor, only one machine is rendered inoperative, which may be repaired without in any way affecting the remaining machines in the room, and there is no friction load to be maintained during the period of shut down. This is without doubt the ideal system in every respect for mill work and one that will undoubtedly be adopted more and more as its advantages are considered.

Figs. Nos. 3, 4 and 5 illustrate the application of this type of drive, showing 1/4 horse power 2-phase, alternating current motors direct connected to looms. Fig. 3, indicates quite clearly the details of the arrangement, showing the method of mounting the motor, and also the gear and pinion by which it is connected to the loom. The switch controlling motor will be noted at the bottom of the motor bed plate. Fig. 4 is a photograph of the same installation showing several looms and the general plan of the room. It will be noted that the arrangement is very compact and of pleasing appearance. Fig. 5, shows the end view of motor direct connected to a different type of loom.

The point will be raised that the first cost of this system will be so great as to render it prohibitive in every case. It is true that the first cost will be somewhat greater than for an equivalent installation arranged for belt drive. It is not, however, enough greater to warrant its being discarded. Some very interesting tests and comparisons have been made on this subject which may prove of interest. Elaborate tests have been conducted in mills using the group tyne of electric drive. The shafting and belting have been carefully measured from which the costs have been determined. These costs will of course be less than the cost of equipping a mechanically driven mill; as in the latter case the heavy main driving shafts would have to be included. The cost of the shafting and belting together with the motors has been compared with the cost of a requisite number of individual motors for the same machines. The difference shows the excess of the proposed investment (direct drive) over the present investment (group drive). Interest on this amount at 5 per cent. has been allowed; in all cases this interest charge has been balanced against the saving in horse power at $25.00 per year per horse power, due to the absence of shafting; the differences in motor efficiencies being taken into account. The results show the saving per year credited to the direct connected drive. Take for example the spinning room in one of the large New England mills; in this mill a 200 horse power motor operates 52 ring spinning frames. The cost of the installation is shown as follows:—

Motor,	$2,060 00
Belts and shafting,	634 00
Total,	$2,694 00

leaving a difference of $2,596.00 in favor of the group drive. Interest on this amount at 5 per cent. would equal $130.00 per year. It was found from actual tests at the above mill, that 37-1/2 horse power was required to drive the shafting load, no frames being in operation. Taking into account the difference in motor efficiency, we find a saving of 18 horse power by using the direct connected method. Eighteen horse power at $25.00 per year amounts to $450.00 which, compared with $130.00, the interest on the increased investment, shows a saving of $320.00 a year, or, that the direct connected drive would pay for the added investment in eight years. Similar figures in connection with the weave room showed a saving of $277.00. In the above figures, no account has been taken of the saving effected by the reduced cost of maintenance, neither has the increased production been considered.

Regarding this matter, the writer might state that this is not an extreme case, it being one mill selected from a large number of tests, and represents an average condition. Of course no case can be decided on general practice, and each will require careful consideration on its own merits. It

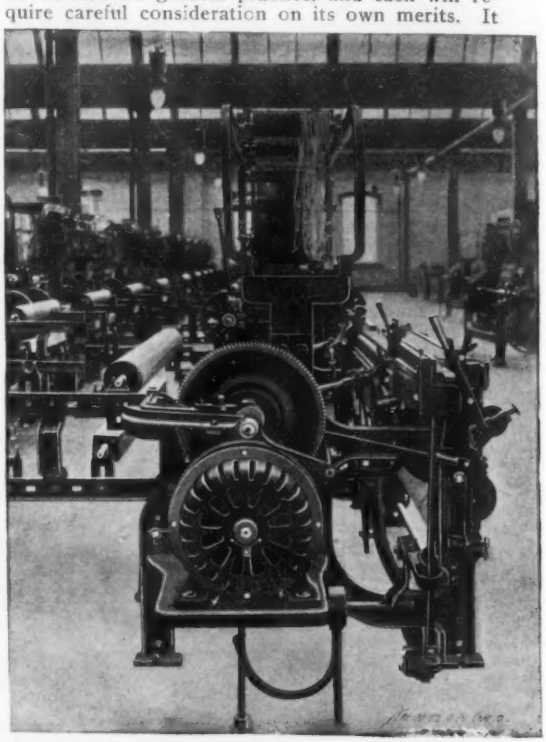


FIG. 5.

appears, however, from tests conducted in both northern and southern mills, that ring spinning frames, fly frames, rovers, twisters, slubbers and looms are particularly adapted for direct drive. In carding and picking the advantages are not so pronounced. It may be said that while the direct drive works out well in theory, it would not hold true in practical operation. In reply to this, the writer can only say that in all cases where the system has been tried, it has been pronounced by the users as entirely satisfactory and has surpassed their expectations in every respect. In fact, this problem today occupies the same position as that of the electrically driven machine tool of about two years ago. It was recognized by all metal workers that the motor drive was convenient and cleanly, but

that the excessive cost would render it prohibitive, but when it was proved that the production of their shop could be materially increased by the direct driven tool, interest was speedily aroused and at the present time, machine tool builders are called upon to furnish about 40 to 60 per cent. of their entire product arranged for motor drive. The growth in this particular branch has been something remarkable, and the advantages gained are no greater than those to accrue from the use of this system in textile work.

Already considerable interest is being taken in this matter, and if the growth of this type of drive is as rapid as has been the growth of the group drive as applied to textile mills, it will be but a few years before many thousand horse power will be in operation.

Boiler Plants in Bleaching and Dyeing Mills.

BY GEORGE I. ROCKWOOD, Worcester, Mass.

In some of the older centres of the New England textile industry, there may be found quite a number of large bleaching, dyeing and finishing mills which have attained their present great size and great diversity of products very gradually and hence almost unconsciously. Their original projectors never expected them to spread out as extensively as they have done and not very much attention has been paid to maintaining always the best disposition and inter-relation of their several departments and buildings. Unlike the goddess Minerva, who "sprang full-panoplied from the head of Jove," they were of no such consequence when they were born; extreme economy was the only policy followed in purchasing new buildings and machines, and now the best that can be said of them in explanation of their inefficient organization is that no one was responsible, for, like "Topsy," they "just growed."

Such concerns, however, can no longer be let alone as they are. They feel the full force of the competition of many newly established plants, upon which the most careful study on the part of the most up-to-date managers and mill architects has been expended with a view to reducing to a minimum all unnecessary steps, processes, labor and material. What shall the managers of these ancient and inefficient properties do? Some will follow what is called a "safe"—that is, a timorous —policy, adding a "wart" of an extension to a building here, and introducing a bit of an improvement in a process there. In all things they will, as the saying is, "walk on one shoe to save the other," a limping, slow gait at best; but in the end such a policy won't save them. The inevitable reconstruction will only be more difficult when it does come, and the capital outlay is sure to be all the greater.

Among the more important questions now arising in such mills is that of how best to re-organize and consolidate the steam generating and power department. In their series of buildings, old and new, there are generally several complete boiler and engine plants, besides a water turbine or two. The shafting runs all sorts of ways and does not exist in suitable sizes to lend itself to a central drive. Again, any concentration of the boiler plant in one spot favorable to coal-handling must be considered along with the uses to which the steam is to be put and the distances it must travel.

Steam must be supplied to the bleachery, the dye-house, the print-works, the fast-black plant. The boiler-house should be on the edge of the railroad track, or, it may be, the wharf. The products of combustion must be discharged at such a point and elevation as to insure freedom from dirt in the bleachery; while, for the same reason, the fast-black plant, though it gets its cloth from the bleachery, should not be near enough to it to discharge fumes in that direction. Without doubt—though contrary to one's first impulse—the chimney should be as close to the bleachery as it is possible to get it. Smoke never, in any state of the atmosphere, settles straight down; whereas, the smoke from a chimney situated one or two hundred yards on one side of the bleachery may quite easily soot the cloth when the breeze blows towards it and the humidity is high.

In the light of the manufacturing requirements touched upon above, an examination of the actual state of things, made by an outsider with a view to suggesting radical improvements, is likely to leave one in an exhausted and discouraged condition of mind. He feels, after seeing the menagerie of unsuitable buildings, shafting, power and boiler plants, that it is time to call in the surgeon and then start again.

As to reorganizing the power, in nine cases out of ten nothing can be done to effect much economy by concentration unless the owners will consider the expense of an electric drive. Fortunately, the power requirements of the kind of mills in question are relatively small. Many times the number of boilers needed to supply a single large engine for driving shafting are used to make steam for kiers, dry-cans, dye-tubs, ageing machines, etc. The machines to be driven are widely scattered. The cost of an electric generator and motors is relatively small; and to establish the policy of concentration made possible by the use of the electric transmission of power is of great importance to the subsequent growth or alteration of the plant as a whole. The steam turbine can only be used to drive a generator. It cannot drive direct, by ropes or belts. The steam turbine cannot be used, therefore, unless the electric drive is also used. But the turbine has an advantage, as a source of dye-house or print-works power, over the reciprocating engine in one important particular; namely, its exhaust steam is pure and uncontaminated with cylinder-oil and can be used in creating a hot-water supply in the place of live steam. The steam turbine and generator combination is very considerably cheaper in cost of installation, and is somewhat so in cost of operation, as compared with the steam engine-and-generator unit. From the writer's experience thus far with steam turbines, he would favor their purchase every time and for every place when the electric transmission of power is in itself desirable. It may be said, in passing, that electric motors should not be put up inside the bleacheries themselves, nor in any place where fumes or vapor can harm them, otherwise they may prove expensive indeed.

One reason why it is very desirable to consolidate the power in one spot is that the cost of high-

ly paid engineers is reduced to that of one man, and he may quite as well be the same individual as the chief engineer of the consolidated boiler house if the engine room adjoins the boiler room. In a particular mill where two or three years ago there were 31 Corliss boilers of the older types—rolling-pin and centennial—18 of which were used for manufacturing purposes and the rest for power, a saving, by consolidation into one modern boiler house and steam turbine plant, was effected amounting to $75 per diem for coal and to $14.40 for reduced labor; and this with an increase of wages paid the single chief engineer of $1 per diem. Yet the greatest advantage of the consolidation to these mills was prospective rather than actual, for, in the future, they have but to extend this boiler house and turbine plant to provide any reasonable increase without further expense for a chief engineer, besides saving many minor expenses. One would invest $15,000, if necessary, to save the cost of a second chief engineer, whereas, no extra investment at all is needed if the consolidated boiler plant is of such a design as to admit of extension without its affecting the old plant already at work.

In order that one chief engineer may be able to watch effectively the daily routine of a large power and boiler plant, one thing must be uppermost in designing the original lay-out; it should be compact, and of such shape and dimensions that the engineer can easily see and speak to every fireman, coal passer, and oiler without moving about much himself. The limit to the size of a boiler plant which one man can properly oversee in this way may be placed at something over 5,000 boiler H. P. Obviously, no labor is saved by concentrating in one unit, a larger plant than can be carefully attended to by a single engineer; a self-evident truth, but it seems to have been overlooked completely by the designers of the great metropolitan electric power stations, and may be emphasized, now, as mill engineers have been turning more and more to these stations for inspiration in handling the design of the larger industrial boiler plants of the sort we are now discussing.

Just what design of boiler plant constitutes the best possible arrangement is something of a riddle. The key is found in devising a satisfactory coal-handling scheme. The plant which has the most economical coal-handling methods in use will be the most economical producer of steam; so that the answer to all other questions of design should wait until after the designer has fully convinced himself on this point. Here, too, is where the greatest difference of expert opinion lies. The question of selection between water tube and fire tube boilers, for instance, and of whether or not to use economizers, and of mechanical versus chimney draft, these questions are of subordinate importance and, besides, are pretty well understood. Let us therefore, consider the subject of coal and ash handling first.

There are three or four different methods in common use, but it is safe to say that the most common way found today in our New England boiler houses is to team the coal from the railroad or schooner to a coal-dump near the boiler house, and then to wheel-barrow it from the dump to the furnaces, into which it is fired by hand. This takes men. How much capital would one invest in plant and machinery to save the labor of one man? If the money can be borrowed at five per cent., that much must be saved clear anyway.

The life of power machinery cannot be set at longer than twenty years for fear of its becoming obsolete then, even if not worn out; this means another five per cent. To this must be added about six per cent. for repairs, insurance, supplies and taxes. In round numbers, therefore, sixteen per cent. of the investment should not be a larger sum than the wages saved. So the safe rule is to multiply by six the wages it is proposed in any case to save by investment in machinery and buildings, and the product represents the limit of prudent capital expenditure where the purpose is solely to save wages. Judged by the application of this rule, the coal team, wheelbarrow, and human stoker combination will be found the least economical of any, except that most modern of all designs, namely, a structural steel boiler house, having an expensive steel construction for supporting the boilers, and boiler-room story above an ash-collecting floor; another story above the boiler room for economizers and smoke-flues, and, away up fifty feet in the air, a great steel and masonry coal-storage pocket served by a bucket or belt conveyer and discharging the coal by gravity, through pipes, into the hoppers of mechanical stokers. The fixed charges on such a structure will be found so great that nothing but the most excessive cost of land—such as rules in the down-town portion of New York City—will justify it, even if that ever does. In order to go up in the air and support thousands of tons of steel, masonry and coal, one must first pay for going down into the ground to bed rock with foundations. No other natural foundations are able to hold the weight on the columns without settlements which will affect the joints of piping and machinery under steam and water pressure.

As in other cases, so in boiler house design, the true economy is found in adapting as much machinery and as expensive coal pockets—in comparison with the more simple, but too costly, reliance on man and beast power—as will return sixteen per cent. or thereabouts on the capital which pays for them; and it will be found, on investigation, that all the advantages of the modern boiler house may be had with far less expense if the coal pocket be placed directly on the ground and on one side or end of the boiler plant proper. By thus leaving the roof of the boiler house unencumbered with the coal pocket, not only is the simplest and cheapest structural-steel design possible, but a skylight over the center-isle between the boilers makes the whole boiler room light, airy and fit for a decent man to work in; whereas, some of these modern boiler rooms can only be compared with underground dungeons.

The novelty in the plants to which I desire to call your attention consists in the use of mechanical stokers served by coal tip-cars, running on tracks at a level just above small bunkers suspended directly over each stoker and holding each one ton. The capacity of two men, whose combined wages amount to $1,000.00 per annum, is 5,000 boiler horse power when pushing a car holding one ton of coal. They have to push the car an average distance of 100 feet from under a hopper in the large—2,000 ton—coal pocket to the indi-

vidual stoker bunkers. As it is impossible to operate any mechanical coal-distributing plant with less than $1,000.00 wages per annum, nothing would be saved by overhead construction and gravity distribution. That is to say, men must be attending to automatic scales, or starting along the coal in the vertical coal distributing pipes when it refuses to descend. But even if the whole sum of $1,000.00 per annum could be saved by overhead construction this, by the rule, would permit a maximum expenditure of $6,000.00—a sum totally inadequate.

A coal-pocket built directly on the ground and enveloped by a bucket conveyer could be made entirely of wood, tied together with iron rods. If placed over the boilers it must be of steel and lined with concrete or brick. In the coal pocket of the plant shown, the conveyor passes right around the pocket endwise, and (1) may be used for emptying the bin into which the electric coal cars discharge their loads and conveying the coal up and into the pocket at any desired point longitudinally; or, (2) it may be used for turning over the pile from the bottom to the top in the event of heating; or, (3) it may be used to elevate the daily supply of coal for the boiler house into an isolated bin at a high elevation, from which it may be drawn by gravity into the coal tip-cars, as stated above, for distribution to the stokers. A 2,000 ton pocket, exclusive of the land, costs completed, with coal crusher, conveying machinery, electric motors for driving them, receiving hopper foundations, and elevated bins, about $20,000. Its advantages over a mere dump are (1) it enables coal to be received in storage without either a first or second shoveling; (2) it stores coal economically as to extent of land; (3) the conveyor saves the coal in case of spontaneous combustion; (4) the conveyor permits accurate measurement of mixtures of anthracite with bituminous coal; (5) the elevated bins from which the tip-cars get their supply by gravity, are filled from the pocket by the same conveyor. Fire is less likely to occur by spontaneous combustion in a wooden pocket than in the tight steel pockets of the kind necessary if put over the boilers, because the sides and bottom of the wooden pocket are open slightly between the planks, thus aerating the coal. If the coal does catch fire it is easier to extinguish it, and the wooden lining is cheaper to renew. A pocket is of advantage near a bleachery because it limits the flying coal dust.

The desirability of purchasing automatic stokers is a very much discussed subject. Certainly they will not pay if their use is unaccompanied by mechanical means for filling their hoppers. How often does one see in a mill plant any attention paid to this point! We have often seen stokers put in with great expectations of economy of labor and coal; and the fireman is also expected to shovel every pound of coal seven feet up into the hopper from the boiler room floor. How much attention is a fireman likely to spend on the economical working of the machine when coaling it is attended with so much laborious effort. With the method of coal handling shown in the illustration, which is useless without stokers, the mere saving in labor is sufficient to warrant their use; and, if operated as intended and as they may be seen operating in many large plants, stokers will save coal over the best ordinary hand firing, especially when working with bituminous coal.

With regard to the best type of boiler, we have no fault to find with the kind—upright firetube—shown in the illustration. A preference for this type is based on its price, $7.50 a horse-power erected, its compactness, the ease with which tubes may be swept, and the fact that it gives superheated steam. It is a great steamer, and there is nothing to choose between its economy and that of any other correctly designed boiler and furnace. The boiler shown is seven feet diameter, 3/4 inch shell with quadruple-riveted butt-strap joints. It is supported on a steel frame work, independently of the brick furnace. It is desirable, however, that only clean, soft water shall be fed to a boiler of this type. If scaly waters are to be used, the B. & W. or Sterling water-tube boilers are to be preferred.

Economizers are frequently omitted from otherwise first-rate plants. This, however, is unquestionably a mistake, as they take the place of just so much heating surface, if similarly placed in the boilers, and deal with comparatively cool water which could not be dealt with in a boiler so effectively. It would be better to deliberately install fewer boilers and supplement them with economizers, than to try to do the whole work with boilers. 600° or even 650° Fahrenheit are not too hot for the gases as they issue from the boilers, where economizers are used; yet 400° to 500° are much more common figures. Economizers save about 9 per cent. of the total fuel bill. In a certain plant the economizers cost, completely installed, and making due allowances for the extra cost of the boiler house because of their presence, something less than $15,000. The coal burned per annum is about 15,000 tons, which at $3 a ton, equals $45,000. Nine per cent. of $45,000 = $4,050, which is 27 per cent. of their cost, or 11 per cent. more than the 16 per cent. necessary according to the rule given above.

Mechanical draft versus chimney draft is another question not fully settled in the minds of experts. For bleacheries, however, both should be provided, The chimney is needed because the soot must be discharged at a high altitude to avoid contact with white goods. By means of the fan a smaller installation of boilers will do the work of supplying sudden demands of dyehouse or bleachery for gusts of steam for an hour or two, than would otherwise be required. This is much the more economical scheme as compared with the large reservoir of hot water idea, embodied in a much larger boiler plant than the fan would make necessary and working the greater part of the day very lazily under a light chimney draft, simply to be there when the heavy demands for steam come. It is not, apparently, generally realized that a stoker grate is more durable under a heavy fire than under a light one; and sudden changes from heavy fires to light ones cause the grate to burn out very fast. Again, a mechanical draft system costing $5,000 installed will do the work of 16—220 horse-power boilers with 12; the 16 having only a 175-feet stack. Each boiler, with its full equipment and building, costs about $8,000. The difference between 16 and 12 is question as to the desirability of providing both chimney and fan in this class of boiler plants; and 4 boilers saved, or $32,000. Thus there can be no the same thing has been found true in large electric power plants.

Few owners realize when they commence construction what a large proportion of their cost will go for piping and pipe-covering. It is of the first importance, then, that it be well done from first to last, and by an experienced hand. One advantage resulting from the very flexible suspension of the boilers is in the tightness of the headers and flanges in the steam mains. The boilers can follow, to a slight extent, the motions of these mains.

Boilers in textile mill plants are still very rarely connected up to their mains in such a manner as to avoid water pockets; and the special advantage to mills of perfect natural drainage is that it affords the night fireman more complete security and ease in "cutting in" boilers after internal cleaning, as he "fires up" for the morning start. Often the region around the main valves is very dark, hot, dirty and accessible only by means of a rickety ladder, and it is a matter of considerable danger to open drain cocks and connect up the boilers and main. All this is unnecessary, and avoidable by forethought in the general lay-out of building and piping. In the case of the plant illustrated, the night fireman frequently "cuts in" a delinquent boiler with as much as twenty pounds difference in pressure, and without a snap or a pound.

The building should, of course, be fire-proof. Not only should all trusses be of steel, to avoid stresses on pipe lines and machinery due to the shrinkage of wood, but the roof itself should be of some durable fire-proof, non-shrinkable and non-corrosive material. Cinder-concrete and expanded-metal are as good as anything. Slate may be nailed directly to the concrete, if done before it is too dry and hard.

A carefully planned boiler house, designed with compactness and symmetry in the disposition of every detail, conduces not only to ease in management but also to reducing the necessary size and cost of land and building. The most careful study should be given, in designing the cross section, so as to stow everything as snugly as possible, without interfering with room enough to enable the apparatus to be easily cared for and repaired. If the necessary time and thought are put into such study, it is surprising how many general, as well as minor, modifications may be introduced into the first draft before the best and cheapest design is hit upon.

It should be recognized from the first that a boiler house is an expensive kind of a mill building, and that, therefore, full information as to the kind and size—present and future—and arrangement of boilers should be known before erecting the building to contain them. In fact, the building and machinery should fit each other as exactly as the propelling machinery fits the hull of a ship; only in that way can the greatest economy of first cost and subsequent maintenance be achieved. Moreover, as the boiler house is where the money is being spent every day, the designer should bear in mind that it is not merely a place of incarceration for "Fenians"; on the contrary, a higher class of help must be employed in the future than hitherto. There should be plenty of light everywhere, with no dark corners anywhere, and a state of cleanliness should prevail here as well as in the engine room. Cleanliness, with a good supply of whitewash, in the boiler room is the handmaiden of economy; for it reveals cracked boiler settings, leaky pipes, and shiftless firemen.

The Cloth-Room and Its Equipment.

BY EDWIN H. MARBLE, Worcester, Mass.

Prior to the actual cloth room work, we must stop a moment in the weave room and get our fabric into condition for the processes properly covered by this article. As each cut is taken from the loom, it should be examined by drawing it over a table, preferably an inclined one; so that the examiner may readily detect any imperfect work, as well as properly classify the goods, if more than one grade is made in the same weave room. The operator should look for any irregularity in the work of the loom, inequalities in warp or filling, or more important than either of these, any carelessness or wilful neglect on the part of the weaver. In connection with the overseer of the weaving department these imperfections should be immediately attended to, and if for no other reason than the matter of discipline, the examination should be close and impartial. When the cut leaves the examiner's hands, it is marked or graded, and placed in the proper receptacle to be handled as soon as called for in the cloth room. A checking of the yardage and "seconds" is thus made, before any time elapses between the weaving and the next operation.

While this preliminary process should be introduced into all mills, each fabric requires somewhat different treatment in the cloth room. For the purpose of illustration let us take a piece of sheeting or twill as our fabric: each grade having been received in proper quantity, the individual pieces are brought to the railway sewing and rolling mashine to be assembled, either into a roll or made up into a continuous length.

The first piece is placed in the cradle of the sewing machine,—it is unrolled from the loom bolt and either rerolled on a shell at the back, or plaited down on an endless apron. The last end of this piece is placed upon pins, in line with the sewing mechanism. The first end of the second cut is placed upon these same pins and the goods drawn smooth and tight in width. The sewing machine head is made to travel along a straight line between the pins, stitching the ends together with a continuous loop stitch, and stopping automatically at the end of the seam; the sewing machine feed mechanism is then released, the head is returned to its starting place, and the seam, straight and even, removed from the pins, and the cloth feeding mechanism started. This process is repeated with each seam. The usual method is to roll the goods into a roll of about 20″ to 30″ diameter containing from 1,000 to 1,200 yards; by handling the cloth in rolls it is kept straight and free from wrinkles and in proper shape for brushing or cleaning. When the product of the mill is largely confined to one class of fabrics, it is sometimes found desirable to have an endless apron or an inclined scray, at the back of the sewing machine, connecting it with the brushing machine, and plait the goods down upon this apron, the operator at the sewing machine keeping three

or four cuts of cloth ahead of the take up from the brusher. This makes the sewing and cleaning substantially one process and saves the time taken to stop the brushing machine, when sewing together the ends of each large roll of cloth; at the same time the objection may be raised, that it does not keep the fabric in as smooth and clean condition, as the rolling up method does. To sew the ends of the large rolls together, it is usual to employ a railway sewing machine of the portable pattern, giving a seam the same as that made by the previously described machine. As already stated the sewing is usually done on a machine of the railway or traveling head pattern, as this gives a better seam and a neater operation. More or less rotary or column sewing machines are in use, but no device for rolling or folding is used in connection with this style sewing machine, so that it has a serious disadvantage, in wrinkling or mussing the fabric.

Before we speak of the next machine, let us examine a piece of the goods and see what is required to put it in marketable condition. Laying the goods out on a table, we find there are more or less chits, dirt, and pieces of leaf, either lying on the surface or partially embedded in the yarn, small knots or nubs in the warp or filling project and sometimes slugs or heavy places in the filling are found. We also notice hanging ends or strings caused by the renewing of the filling as the bobbin runs out. The general unevenness or wrinkled character of the face of the goods is quite noticeable. How many of the defects can we reasonably expect to remedy by mechanical processes? Surely the slugs must be removed by hand. The particles of leaf and chit that are tightly twisted into the yarn cannot be removed and we must not expect to remedy in the cloth room all the defects in cleaning the cotton or of carding or spinning the same. You cannot, by adding a few hundred dollars worth of machinery to the cloth room equipment, expect to use a lower grade of cotton and present to the market the same character of goods as made from a better grade.

Some of the mills on the medium and lower grade of goods have contented themselves with a simple brushing machine for cleaning the goods, while the more progressive mills are using larger and more complete machines—with shear blades, brushes and all the necessary cleaning appliances.

The cleaning machine proper consists of revolving appliances for treating both sides of the fabric. The different parts being arranged to suit the character of the goods or possibly the inclination of the purchaser.

Referring to the cleaning appliances of a brushing machine we will describe them briefly. The emery rolls are first wound with twine, and then a heavy surfacing of coarse emery applied. These rolls loosen and knock off much of the heavier leaf, motes or chits, from the fabric. The beaters have steel blades which revolve against the fabric with a scraping action, similar to the hand work of the inspector. This action removes many of the small knots, nubs, etc., from the goods and at the same time loosens much of the other foreign matter, so that the card rolls and brushes can be used more effectually. The card rolls are perhaps the least understood, as they do not have a carding or napping action, but on the contrary, as the card clothing on these rolls is made with a somewhat straighter tooth than usual, and the rolls run with the bend of the teeth pointing backward, so that the numerous wire points remove smaller chits, specks or motes, without disturbing or napping the face of the fabric. The brushes are filled with the best quality of Russian stiff bristles, and these are the only bristles which are effective for cleaning the goods; softer or cheaper bristles not having the stiffness or elasticity necessary.

We have described the usual pattern of brushing machine, which is used on heavier or coarser goods.

On lighter weight goods the emery rolls may be covered with finer emery or omitted altogether. Brushes may be substituted for some, or all of the card rolls, and on still finer goods, brushes alone would be used. Rolls covered with sand paper of varying grades are at times found quite effective, though the paper requires replacing often, and unless renewed as soon as the grit is worn off, are of little value. While this brushing machine will remove a very large portion of the foreign matter, there will remain many of the threads, and some of the knots and nubs. The loose ends and more or less of the undetached threads are caught by the emery rolls, card rolls and brushes, or scraped off by the beaters. To thoroughly remove the threads, shearing appliances must be used and the combined shearing and brushing machines will be considered later.

While the sewing and brushing processes are distinct and separate it has been found quite desirable to so arrange these machines, one behind the other, that the rolls of cloth when taken from the back of the sewing machine can be readily passed to the front of the brushing machine. Trucks with concave beds are sometimes used. Tracks or rails raised a little more than one-half the diameter of the roll of cloth from the floor and the length of the winding rolls apart, connect the two machines. On these tracks several rolls of cloth may rest, and the ends of cloth can be readily connected with but little lifting and handling of the rolls.

All brushing machines or combined shearing and brushing machines are regularly provided with either rolling up attachment or plaiting down device. For goods that are to be sold in the brown, or sent to the converters in a roll, an attachment known as the calender rolling machine or head is largely used. This is an upright frame in which there are two rolls; the cloth enters over proper spreading devices, passes down under the bottom roll, between the two rolls and around the top roll to a wooden roll above, on which it is rolled. These two iron rolls are usually heated by steam and the top roll driven by gearing at a slightly increased surface speed over the bottom roll,—this giving an ironing effect, which straightens out the fabric, smooths out the puckers and wrinkles and rolls the goods in a smooth, hard ball. When the rolls are to be used hot, a steam vapor cylinder is placed in front of the machine so that a slight dampening may be given to the goods before being acted upon by the iron rolls.

The wooden roll on which the cloth is wound is held in contact with the top iron roll by racks, which are so arranged with gearing and friction device that any required amount of pressure can be

applied, to make as compact and hard a roll as desired. These two iron rolls do not come directly in contact with each other, but are held a little apart by wedges between the bearings, which can be adjusted so that the rolls may not have the effect of crushing the texture of the goods. For goods sold in the brown, it is usual after they have been dampened, ironed out and rolled up, in this way, to allow them to remain on the rolls for a few hours or over night, since by so doing a much smoother effect is produced and a softer "feel" given to the fabric. In connection with this calender rolling machine, various additional attachments are often furnished.

A revolving spreader roll is used when the fabric is light, or by its composition liable to wrinkle or crease. This spreader roll delivers the goods to the rolls free from these objections and without undue strain or stretching in width. As many of the goods are delivered in the form of large rolls to the converters, a measuring device is required to measure the goods accurately as they are being rolled up. For this purpose a roll is used presumably one yard in circumference, to which is attached a dial indicating the number of revolutions, corresponding to the number of yards run. But as the goods vary in texture, elasticity, and amount of stretch when under tension, a measuring roll in its primitive form is not a very reliable device. To overcome variations in the fabric or conditions in running, the measuring roll had an adjustable pulley on the outer end of its shaft, and from this a belt runs to the recording portion, which is placed on the side of the machine in the most convenient position for reading the figures on the dial, at the end of each roll.

The pulley on this recording device is of the same size as the adjustable pulley when at its mean diameter, and indicates the same number of revolutions, but should the actual yardage as tested by a yardstick or on a table, prove to be less or greater than the indicated revolutions, a slight variation in the size of the adjustable pulley will cause the dial to indicate the correct measurement. A variation of a slight percentage in the stretch will be hardly noticeable in a single yard, but its repetition will make a decided difference in the total product for the month. Even a testing of the yardage by the usual method on the folding machine is not by any means positive, as the same or a counter variation may be shown, in the number of folds made. Better have the measurement tested on the floor or on a ten-yard table, and then carefully adjust the recording device to correspond.

An important point to be considered when running the calender rolling machine in connection with the brushing machine is the matter of tension or strain on the cloth. The calender rolling machine is driven direct from the main shaft of the brusher or shearer and the calender rolls become the draft rolls of the combination. That there may be no undue straining of the cloth between the two machines, it is desirable to provide some means for assisting the cloth in its movement through; this object is attained by providing a draft roll on the brusher or shearer with an adjustable pulley which is driven from the lower of the two rolls on the calender. This adjustable pulley allows you to regulate the surface speed of the delivering roll, so that no strain is caused by the taking up of the cloth by the calender rolling machine. Should the tension on the cloth between the two machines be excessive, the cloth will be drawn down in width and the warp may be subjected to such a strain as to injure the texture of the fabric.

The combined shearing and brushing machine is the most complete cleaning appliance yet introduced into the cloth room. It is an elaboration of the machine already mentioned. Sets of shear blades are added for one or both sides of the goods and are arranged in connection with the other cleaning appliances in different combinations, varying with the quality of the fabric and the treatment it requires. While the face of most goods requires more cleaning than the back, sheetings and similar fabrics must be treated substantially the same on both sides. The combination shearing and brushing machine is known by the makers as Model No. 55, and has the following arrangement of parts. The front of the machine where the cloth enters is provided with emery rolls and beaters of the same pattern as described in connection with the brushing machine. On the top, first a card roll, then a brush, then two sets of shear blades, then a second brush and a third set of shear blades, all for the under side of the goods. For the upper side of the goods we have a card roll, a brush, two sets of shear blades, and back of the top shear blades there are brushes set with softer bristles for both face and back of the goods; these two last running in a direction opposite to that of the goods, and being used to pick up and remove any lint or threads which have been loosened by the previous cleaning rolls.

The brush for the upper side of the goods is provided with a pan or trough into which the loose dirt is thrown, while the brush below the cloth throws the particles into the hopper to the exhaust fan. It is quite necessary to adjust the contact of the cloth on the various parts so that each shall do its proper amount of work. The emery rolls can be brought to bear quite hard against the goods, and the beaters made to scrape somewhat severely, both of them running against the travel of the goods. The card rolls preferably run so as to throw forward, or with the goods, as do the brushes in front of the shear blades. Of the shear blades and their use much can be said. They consist of a revolver, or revolving cutter running in contact with a stationary blade. The adjustment of these two cutting parts, though comparatively easy, requires some mechanical ability, but it must receive careful attention.

In examining the cutting parts in different mills, it is no unusual thing to find the revolver and ledger blade, either not in contact with each other, or so dull that they simply catch a projecting thread and draw it between them, should the thread be of firm enough composition, the fabric is also drawn into the cutting parts and cut or torn. Whereas, if the parts were in proper condition, the thread would have been severed close to the fabric. It may be that through inattention the cutting portions have not been properly oiled and allowed to run dry, in consequence, have become chafed or rough, and oftentimes the temper is drawn so that the high grade steel which forms the cutting section is worthless, and for practical use, of no more value than a tin jackknife blade.

This is not the place to go into the details of grinding and adjusting these cutting parts at this time, suffice it to say that with proper care and adjustment they are most valuable additions to the machine for the removal of threads, fuzz or nap.

The combined shearing and brushing machine described is a most complete arrangement of cleaning appliances. It may be that the mill is called upon to make goods of entirely different organizations. The overseer of the cloth room has but to remove, or change the belts driving the different appliances, to stop emery rolls and card rolls for lighter weight fabrics, or he can so modify the combination as to adapt the machine to nearly all classes of fabrics.

Several years ago the following plan of taking care of the cutting parts was adopted by one of our progressive agents. He first procured an extra set of bottom and top shear blades, and had his four shearing machines put in good condition. Selecting a clear headed young mechanic, he sent him to the works of the makers of the machines and arranged to have him receive suitable instruction in grinding the cutting parts together and in setting and adjusting them. On the young man's return, it was arranged to have the machines examined every Wednesday during the noon hour and every Saturday forenoon, while the room was being cleaned up. If any of the shear blades were out of condition, they were adjusted, or, if necessary, were replaced by an extra set. Any other little repairs such as the adjustment of vibrate blocks and levers to take up wear, the cleaning and tightening of belts or similar work, were done at the same time. During the week, at such time as was most convenient, the spare set of shear blades was overhauled, ground together and adjusted ready to replace another set, or if they were worn out or required extensive repairs, they were sent to the maker. We can speak from experience, when we say that this set of machinery is returning good interest on the money invested.

What is being done in this mill can be done in others, and in many cases would greatly improve the results now being obtained, and I venture to say that one-third of the brushing and shearing machines in use are not doing more than one-half the effective work they should do. Oftentimes the brushes are worn and uneven, the bristles being nothing but stubs; the beaters worn smooth on the edges, so as to be without any scraping value; the emery rolls worn off in places, or so filled with dirt as to be without value for cleaning. Perhaps the draft roll has been worn smooth, and some one unacquainted with the results has recovered it. It may be he has tacked the cloth on, and as is sometimes the case, driven tacks along the centre of the roll so that at each revolution of the roll a tack head is brought into contact with the cloth. If there is an iron roll on top of the draft roll and the tack head projects a little, the chances are that a little break in the thread will occur and be brought to light when the goods are finished. Probably more vardage has been damaged by carelessness in this way, than by any other fault in the cloth room.

If the product of the mill is other than sheetings or drills, a pattern of shearing machine differing from the style above mentioned, may be preferable. Should it be necessary to finish but one side of the goods a machine similar to that known by the makers as model No. 431 may be substituted. This machine is arranged with a brush, two sets of shear blades, a second brush and two more sets of shear blades, all for the face of the goods, and following these is a brush for both face and back of the goods, for removing any loose particles of lint or dirt. The machine shown has the horizontal rolling brackets with weighted slide, controlled by cam movement so arranged as to exert the greatest pressure, on the wooden roll, when the cloth roll is first started. To this arrangement may be added a combination of cleaning parts, in front, composed of emery rolls, beaters or brushes for one or both sides of the goods.

In this connection, it may be well to state that the term combined shearing and brushing machine, is about as comprehensive as the term, a suit of clothes. These are built in more than forty different combinations of cleaning parts, on the top of the machine, eight or more combinations known as front attachments, and at the rear various rolling, calender rolling or folding attachments; all of these arrangements may be called for in widths varying from 39 inches to 72 inches of working surface, or, in the matter of the brushing machine for goods from 30 inches to 144 inches wide. Should you desire to order a machine, don't be disappointed if the maker has not in stock, the particular arrangement in the particular width, best suited to your conditions.

From the cleaning machine, the goods will be shipped to market either in rolls or in folds. Those that require folding are taken to the folder or yarding machine and put into suitable form. In this connection, a matter of considerable importance to the mill may be spoken of. We usually refer to this machine as a yarding machine, meaning that it puts the goods in folds, which, we in all honesty, say are yards. Strictly speaking, this term yarding is a questionable statement, and we will give two reasons for our reference—when unfolding the cloth and comparing the fold marks, laying the fabric so that top and bottom folds can be compared, we find the top folds do not correspond with the bottom folds, the tendency being to an elongation in the upper folds, this is caused usually by the rounding up of the cloth in the centre between the jaws, as is has laid fold on fold by the machine. Another defect may be noticed. While the machine may be set to fold an exact yard, varying tension on the goods may give a different measure, and what may be correct yardage on one class of goods may show a difference on another class. While errors of but a trifling nature have come to our notice, yet as most cuts are comparatively short the accumulative error is not easily shown, on that cut, but the aggregate yardage of the mills as shown by the folds, may be far from correct.

Take the matter of rolls that contain 1,000 or 1,200 yards, the accumulative error is more readily noticed.

The use of the automatic drop centre device on the folding machine, has overcome much of the irregular folding in each piece, while the machines of more recent build have been nearly correct from a mechanical standpoint. Of the two different ar-

rangements of folders known as the high front frame and the low back frame machines, each has its purpose. The high front machine, which feeds the cloth into the folder over the head of the operator, is used largely for finished goods; while the pattern which delivers the goods from the back toward the operator is used for goods in the brown, or on the general run of soft goods. The delivering of the goods over the head of the operator has one serious sanitary objection. Any dust or dirt is liable to drop on the head or shoulders of the operator and the covering of the head by a cap is quite necessary.

A recent improvement in one make of machine may be noticed; viz., the swivel rod which tips the blades, through which the cloth passes, has been changed. The older machines had this rod swinging from the bottom and as it swayed back and forth with each movement of the blade, it was rightly called the eye slasher. This rod is now hung from above and swinging below the line of the table avoids any liability to strike, or interfere with the operator.

When and how finally to inspect the goods is the question that appears to be the most difficult to answer. The time and expense that must be charged to this portion of the cloth room always looks large. "It seems like making the cloth room pay the expense of correcting other people's faults," said an old cloth room overseer a few weeks ago, and that is the idea carried by others similarly situated. It seems inevitable however, that the cloth room, like charity, must cover a multitude of sins. Many faults in the fabric, caused by imperfect working of various machines and operators throughout the mill have been brought to light in the cloth room, and must be corrected so far as possible by the operators in that department. Remove the cause of the faults, as much as you can, before the fabric reaches the cloth room, but you must still provide means to remove some faults after the cloth has been cleaned and prepared for this inspection.

Of all the different machines which have been arranged for this work, the most popular is the plain inspector, with inclined table, cloth cradle in front below the table, draft roll with forward and reverse motion at the upper part of the frame, and either rolling or folding attachment at the back. The cloth is placed in the cradle and brought up to the table—a slight pressure on the long treadle in front starts the draft roll, and the cloth having been passed into the bite or nip of the rolls is drawn up the inclined table away from the operator, as long as the operator keeps her foot on the treadle. The dark background of the table assists in disclosing imperfect work and whenever the foot is removed from the treadle the fabric stops, allowing the imperfect spot to be picked out or up, combed over or brushed.

The work of inspecting the cloth is pleasanter for the eye and less tiresome if it passes upward, than if drawn down toward the operator. It may be that a defect shows for quite a distance, a broken selvage is found for a yard or two—in such cases the foot is removed from the front treadle, and placed on the side treadle, and the cloth is drawn backward from the roll and slides down the table, so that the extent of the injury is noticed and proper allowance can be made. The machine is light running, all parts are easy of access, and the slant and height of the table such as will suit the average operator. This machine is used in different mills for an examination of the cloth in the weave room before it is cleaned, also for the final inspection after it has passed through the brusher or shearing machine. The question of the direction of the travel of the cloth on the inspecting machine has not been settled to the satisfaction of some and a few mills are using machines arranged to run the cloth the reverse way. The cloth is placed in a cradle on top and drawn forward over the table, and then to the rolling head at the back. While the method has its advocates it is open to some objections.

A method used in some mills is to wait until after the goods are folded and then lay them out on a table, and then by turning back each fold, examine and correct in that condition. The opposite side of the folded goods is then handled over and similarly examined. This method has serious objections, the principal one being, the fact of disturbing the folds, and should any imperfect places be corrected, the inconvenience of handling of the individual fold of cloth. It is considered less perfect an inspection than the inclined table method, and at its best is rather an examination of the general appearance of the goods, than a close inspection for the correction of faults.

We have endeavored to give in a general way the requisite treatment of sheetings and drills, with the modifications required for some of the finer fabrics.

Muslins and fine fawns which will be injured by any severe action of the brushes or other revolving parts require some other modifications. Being better prepared in the card room and the spinning room the yarn goes to the loom almost perfect. The weave room examination is more for the purpose of disclosing any loom errors, particularly, thick and thin places in the cloth. For this class of fabrics the shearing machine has usually two sets of shear blades for the under or face side of the cloth, and one set of shear blades for the upper or back of the cloth with the necessary brushes for each side of the cloth before and after the shear blades. The brushes are as stiff as can be used without distorting the fabric and the entire machine arranged to handle these delicate fabrics.

As this class of goods is subjected to a closer examination on the counter, we must give them a closer inspection, and what has been called the cloth inspecting and spinning machine is generally used. Its general construction is similar to the plain cloth inspector, previously noted, but it has in addition three revolving brushes, one of which cleans the face and the other the back of the cloth before it reaches the table. The third brush acts upon the face of the cloth after the inspection, removing loose threads or lint which may cling to the fabric. The starting and stopping of the cloth is by means of foot treadles, with an arrangement similar to that on the plain machine, but the brushes are so driven that they revolve only when the cloth is moving forward, stopping when the cloth does, and remaining stationary when the reverse motion is used. These brushes are of special construction and stiffness and are only applied

to this particular machine. The cloth cradle in front and the rolling up or plating down device at the rear complete the machine.

We have not touched upon the baling press, or the shipping arrangements as they are usually well arranged and not particular to any one class of fabrics.

Were it admissible to extend this paper, we would like to consider the lighting of the room, the arrangement of the dirt and dust removing devices—the placing of the machines in the proper sequence, the special modifications for broad goods, as well as those for heavy ducks. One point alone would we like to refer to and a point that should receive special consideration by those fitting up new cloth rooms or remodeling old ones. Why not equip each machine with an independent motor with self contained drive, and avoid the belts with their dirt and lint carrying properties so prominent? Make each machine a unit, starting and stopping it when wanted, and using no power except when obtaining results. It will be the ideal cloth room drive.

In conclusion, let me say that within a week, propositions were laid on my desk for consideration, which call for machinery to finish these fabrics. Cotton duck from 1 inch to 144 inches wide, and from 8 ounces to 32 ounces, weight based on a width of 22 inches, fine lawns and silk stripes, gauze weighing 1 1/2 ounces per square yard, print cloths, 120-inch sheetings, zephyr ginghams, and colored dress goods, and in attempting to cover in this paper a cloth room equipment that with suitable modifications would be adapted to any of those mills, we understood full well the task and beg your indulgence for the way we have performed it.

Experiments in the Manufacture of Cotton Yarn.

BY STEPHEN E. SMITH, Lowell, Mass.

In addition to the regular work of tearing down, resetting, changing and operating the various machines, each student of the Lowell Textile School has an opportunity to work out for himself any problem in which he may be specially interested and at the same time learn the results of all the tests made by other students. This sort of experimental work comprises a part of the last year of the course, and while no one of sound common sense would attempt to apply the facts found in this way to the industry in general, a large number of important points are brought to the attention of the student in a way which impresses them upon his mind much more clearly and for a longer time than could otherwise be accomplished.

A complete list of the experiments would be out of place in this paper. Among them, however, are several tests upon the metallic drawing roll to determine a proper allowance to make in figuring the draft of the drawing frame. This experiment, although tried several times, has yielded a diversity of results, the proper allowance depending somewhat upon the weight and density of the slivers going in at the back of the machine.

While the two different types of roll in use give widely different results, there has always been quite a variation in the results obtained from the same rolls. This is due partially to the fact that the slivers drawn were not alike and partly to the fact that the tests were made by different classes of students. A comparison of the work done by two different types of combers tried by one of our students brought out no startling results and a trial of hard, medium and soft twists in roving produced no extraordinary differences in the strength of the yarn as is claimed by some spinners.

An attempt was made in one experiment to show how much the quality of a yarn, as regards evenness and strength depends upon the amount of draft received in the fly-frames and spinning frame. It is a well known fact that in all the operations performed by hand, an increase in speed is accompanied by a decrease in the quality of work done. It is also generally known by everyone at all conversant with the manufacture of cotton yarn that extremely long drafts are accompanied by a reduction in the quality of the yarn spun. The object of our test was to show to what extent this would apply to a mechanical operation like the drawing process in the fly-frames and spinning.

Number 28 yarn was made from Upland cotton of 1 1/16″ staple employing three different programs of drafts and weights on the above mentioned machines. The table following shows the draft used and the numbers obtained in each case.

	PROGRAMS.					
	Long draft.		Medium draft.		Short draft.	
Yarn spun.....	28.5		28.5		28.0	
Spin draft.....	12.		9.5		7.	
Fine roving.....	4.75	hank	6.	hank	8.	hank
Fine frame draft..	7.30		6.		4.66	
Inter. roving.....	1.30	hank	2.	hank	3.41	hank
Inter. draft	6.25		5.		3.57	
Slubber roving....	.416	hank	.80	hank	1.91	hank
Slubber draft.....	5.		4.32		3.21	
Drawing sliver....	100 grs.		45 grs.		14 grs.	

The great range in the drawing slivers was obtained by different doublings at the back of the drawing frame together with slight alterations in the draft of the same machine. This gives the heavy sliver an advantage over the others in the number of doublings used in its production. In running the different samples the conditions with the exception of the draft were the same, the standard twist multiple of 1.2 being used for the roving and 4.75 for the yarn. In determining the strength of the yarn, one hundred skeins of 120 yards each were broken upon a power tester and the following table giving the averages shows the results at a glance.

	Average No. Yarn.	Breaking Strength in Pounds.	Range of Numbers.
Short draft.....	28.	59.13	26.31—28.85
Medium draft ...	28.5	55.83	26.31—31.15
Long draft.....	28.5	46.86	24.09—30.30

An examination of the yarns wound upon black card board showed very plainly the superiority in evenness of the yarn made with short drafts. The increase in strength over the sample made with long drafts is 26 per cent. for the short and 19 for the medium draft. This test shows a considerable gain in evenness and strength for the short draft and in order to prevent a misconception of these facts in the student mind it became necessary to point out the disadvantages of short drafts in the

way of decreased production and greater amount of preparatory machinery required, increase in number of operatives, floor space, etc., which is wholly unnecessary to an audience of this character. This was accomplished by working out a problem showing the number of fly-frame spindles necessary in each program to produce roving for a given production of yarn.

The carding process by reason of its prominence in the manufacture of yarn has formed a basis for several interesting experiments. In one of these four different settings of the flats of the revolving flat card were tried to show which setting would produce the best yarn with the least waste. The method generally adopted is to set the flats at the back of the card slightly farther from the cylinder than those at the front, in this way spreading the work of carding more evenly over the entire flat surface. Our experiment comprised four different settings of the flats and the table given shows what settings were used at the five points on the flexible bend.

FLAT SETTINGS.

Front	First Quarter	Center	Third Quarter	Back
Very	Med.		Med.	
.007 in. close	.007 in. close	.007 in. close	.007 in. loose	.007 in loose
.009 "	.009 "	.009 "	.009 "	.009 "
.011 "	.011 "	.011 "	.011 "	.011 "
.006 "	.007 "	.008 "	.010 in. close	.012 in. close

In three of these settings the usual method of setting closer at the front than back was followed out while in the last case this idea was carried to an extreme and the setting at the back made twice as wide as that at the front. The different lots of cotton were afterward made into yarn each receiving the same treatment, in fact, it might be called identical as they were run through the drawing and roving machinery together.

The table following shows the results of the carding process as regards amount of flat strippings made and also the strength of a 120-yard skein of the yarn.

WASTE AND BREAKING STRENGTH.

Flat setting.....	.011 in.	.009 in.	.007 in.	.006 in.—12 in.
Per cent. waste	2.07 in.	2.19 in.	2.42 in.	2.20 in.
No. yarn spun.....	27.4 in.	27.7 in.	26.3 in.	27.7 in.
Breaking strength.	62.51 lbs.	62.1 lbs.	61.6 lbs.	65 lbs.

The aim of carders is to remove the greatest amount of short fibres and waste with as few long fibres as possible, and it is known that a close setting of the flats will produce more waste, other conditions being alike.

In our tests the conditions outside of the flat setting were the same and as would be expected the .007 inch setting produced a stripping containing considerably more long staple than the .011 inches while the .006 inches—.012 inches and the .009 inches setting were nearly alike, the .009 inches stripping if anything containing more long fibre.

It would seem that the sample from which the greatest amount of waste had been removed would make the strongest yarn as it ought to contain the highest percentage of long fibre.

The results obtained by breaking one hundred skeins of each of these samples do not entirely uphold this theory and as they all received the same treatment in the subsequent processes, the carding alone would seem to be responsible.

It appears that, with the very close setting of the flats, the machine not only removes much good fibre, but by the severity of its action strains or ruptures some of the cotton passing through thus producing a weaker yarn. It is claimed by many carders, that by the time the flats have reached a point over the cylinder centre, they are so loaded with waste as to prohibit any further accumulation for the remainder of their journey. If this is the case (and it is not improbable) then by setting the flats at the back much wider than the front, a more even distribution of the work of carding would be obtained and at the same time the quality of the yarn increased by reducing the severity of the process. As shown in the table, the cotton carded in this way produced the strongest yarn which seems in itself sufficient argument in favor of this method.

Without wearying you with more details, I will merely mention briefly some of the experiments now going on. The number of doublings in a program, as every one knows, affects very materially the evenness and strength of the finished yarn. Theoretically, by doubling two or more strands at the back of any machine, a more even product is obtained because a heavy and light place in the strand enter the machine together thus tending to produce a more even sliver, roving or yarn at the front.

Of course, it is equally possible that two thick or two thin places enter at the same time, but the results in additional evenness and strength obtained by doubling goes to show that the former condition holds good in a majority of cases. We have under way at present an experiment showing the difference in evenness and strength between five samples, ranging on one hand from a yarn made with no doublings whatever to one made with 27,648 doublings.

Another test now going on is one attempting to show something of the contraction in cotton yarn due to the twist. It is very apparent that the contraction in any yarn is governed to some extent by the way in which it is handled, tension during spinning, spooling, etc. We have carefully selected a traveler which is neither heavy enough to chafe the yarn upon the top of the empty bobbin nor light enough to allow it to thrash against the separator blades when the bobbin is full. By comparing a carefully figured draft with the draft found by weighings, we are hopeful of getting some satisfactory data for the contraction in yarn due to twist. This would probably vary somewhat according to the number of yarn and other conditions outside of the twist so that a complete set of figures could be obtained only by making several sizes of yarn.

One of our young men being interested in the handling of cotton dyed in the raw state is making into yarn, two lots of cotton, one red and one blue and a third lot of bleached stock. It was rather interesting to note the difference between the lots running on the drawing frame. While the blue and bleached gave very little trouble, the red was continually breaking down, and as they were all three drawn at the same time, the trouble would seem to lie with the red dye stuff.

Another student by means of a few old rolls, some cotton ties and considerable ingenuity has converted a part of our ring twister into a machine for producing fancy yarns; has made several styles

of "nub" yarns in various colors and other fancy effects in ply yarns.

Still another man is comparing two ply twenty, three ply thirty, and four ply forty (2/20s, 3/30s, 4/40s), with a single ten to learn something of the comparative strengths; and is also making some twelve ply twenty (12/20) with different combinations of the single and ply yarns and wet and dry twists.

These few experiments show what we are interested in; and in part how we are trying to produce a class of men, who will have a thorough knowledge of cotton machinery and also the power to think and act independently in applying their general knowledge to any problems they may encounter in the work for which they are being fitted.

The Relationship Between the Planter and the Manufacturer; Its Unnecessary Antagonisms.

BY THEODORE H. PRICE, New York, N. Y.

The Arkansas Legislature has recently passed, and the Governor has signed. a law which contains among others the following provisions:—

"Any corporation organized under the laws of this or any other state or country and transacting or conducting any kind of business in the state, or any partnership of individuals or other associations of persons whatsoever, who are now or shall hereafter create, enter into, become a member of or a party to any pool, trust, agreement, combination, confederation or understanding, whether the same is made in this state or elsewhere with any other corporation, partnership, individual, or any other person or association of persons, to regulate or fix either in this state or elsewhere the price of any article of manufacture, mechanism, merchandise, commodity, convenience, repair, any product of mining or any article or thing whatsoever, or the price or premium to be paid for insuring property against loss or damage by fire, lightning or tornado, or to maintain said price when so regulated or fixed, or who now or shall hereafter enter into, become a member of, or party to any pool, agreement, contract, combination, association, or confederation, whether made in this state or elsewhere, to fix or limit in this state or elsewhere the amount or quantity of any article or manufacture, mechanism, merchandise, commodity, convenience, repair, any product of mining, or any article or thing whatsoever, or the price or premium to be paid for insuring property against loss or damage by fire, lightning, storm, cyclone, tornado, or any other kind of policy issued by any corporation, partnership, individual, or association of persons aforesaid, shall be deemed and adjudged guilty of a conspiracy to defraud and be subject to the penalties as provided by this act."

This law was intended primarily to protect the citizens of Arkansas against the exactions of the so-called "trusts" and to prevent agreements between insurance companies to maintain rates, but is equally applicable to any two individuals who shall agree not to sell their cotton below a specified price, or to limit their production of cotton, either by a reduction of acreage or otherwise.

If the newspaper reports are true, a large portion of the agricultural population of Arkansas are under this law "guilty of a conspiracy to defraud."

I doubt if any of them will be so prosecuted and the law itself will probably be adjudged unconstitutional. I call attention to it, however, as it emphasizes the inconsistency of Southern protest against trust exactions while the South is today largely engaged in a futile endeavor to create one of the most oppressive trusts with which the world's progress was ever threatened. That this attempt will fail is a foregone conclusion. That the widely advertised agreement to "hold cotton for ten cents" has already come to naught is evidenced by the quantity of cotton being shipped daily at seven and a half cents, and the purpose of this address is not to combat a movement which has already collapsed, but to point out the mistakes in which it was conceived in the hope that the loss of energy and money which it has caused may be to some extent avoided in the future.

The South possesses a practical monopoly of the civilized world's cotton production. The cost of cotton production as ascertained by the United States Government for the crop of 1896-7 was on the average 4.90 cents per lb., after allowing for a land rental of $2.91 per acre, the net cost in that year being, therefore, about 4 cents per lb. The production that season was 172 lbs. per acre. The production this year is 240 lbs. per acre, and the indicated cost, therefore, 25 per cent. less, or probably not over 3 1/2 cents per lb., after allowing for the increased cost of picking. Ten cents per pound would, therefore, represent a profit of 200 per cent., while 7 cents per lb. means a profit of 100 per cent.

If any organized monopoly attempted to realize such profits as these, there is no doubt that legislation would find a way to deal with it, or that competition would speedily invade its field. Already this is being attempted, and although the efforts that are being made to encourage the cultivation of American cotton in Africa have not as yet been productive of any important addition tc the world's supply, it is well to bear in mind that cotton production in the United States is only one hundred years old, and it is quite possible that many now within the sound of my voice will live to see an African cotton crop of from five to ten million bales per annum seriously threaten the monopoly of the Southern states as cotton producers. Monopolies, it is well to bear in mind, have only been successful and permanent when controlled by a policy the object of which has been to expand consumption through a reduction in the cost of production. This, in fact, has been the secret of monopolistic or trust success, where success has been achieved. In America, despite a clamor which seeks to create a contrary impression, the cost of nearly all trust-controlled manufactured articles has been continually tending toward lower figures. This is conspicuously true of the great exemplar of all successful trusts, namely, the Standard Oil Co. It is equally true of railroad transportation and the problem which the successful railroad manager has to face today is not how to increase his freight rates, but rather how to reduce them and at the same time how to reduce the cost of his transportation. As a result of this policy the consumption of American products in nearly all departments of industrial activity has shown the enormous increase which is expressed

in the prosperity of today. The cotton trade alone is an exception. The consumption of American cotton for the season of 1898-9, according to Mr. Ellison, was 10,695,000 bales. The consumption for the season of 1903-4, some six years later, was 10,273,000, an actual decrease during the period of nearly four per cent. For the current season Mr. Ellison estimates the consumption of American cotton at 11,030,000, an increase as compared with seven years ago of less than four per cent. Is there any department of the world's activity that in the past seven years shows so little progress as this? Is there any department of industrial activity in which the promise of healthy expansion has been greater than in the cotton trade and in which this promise has been so disappointed? Certainly none that I know of.

Why is it that the cotton trade alone is an exception to the industrial progress generally characteristic of the past decade? The answer, in my opinion, is not hard to make, nor the reason far to seek. It is that the South, in the fancied security of its monopoly of cotton production, has been endeavoring to increase its profits by advancing the price of its product rather than by reducing the cost of its production. Misguided as this policy in my opinion is, the efforts that are being made towards its adoption in connection with the cotton crop for which the South is now preparing seem to be more strenuous than ever. In the "Chattanooga News" of March 16, 1905, I read the following:—

"B. Dixon Armstrong, an officer of the Southern Cotton Growers' Association, is in the city. Mr. Armstrong reports great enthusiasm and wonderful results up to the present hour in the organization of the association. For instance, he states that out of 812 cotton-growing counties in the South, 729 have been heard from, and more than two thirds of those heard from have been thoroughly organized. The others are receiving the earnest consideration of the central organization, and organizers will be sent to each county not organized within the next few days. In speaking of this work, Mr. Armstrong said: 'Four hundred and eighty-six thoroughly organized counties report a reduction in acreage averaging 27 1/2 per cent., and reduction in the use of commercial fertilizers of from 30 to 40 per cent. The remaining 233 counties in process of thorough organization, though not yet complete, show an average of 22 1/4 per cent. reduction in acreage and 30 per cent. reduction in the use of commercial fertilizer The number of signers of the pledge and members of the association up to noon yesterday is estimated to be 1,200,000. By reason of incomplete reports, which are being revised, this cannot be accurately stated, but we feel sure that it is conservative, and by June 1st, we confidently expect and do not doubt we will have two million members. Reports from the entire South show that no farmers are offering for sale a single bale of cotton. The distressed cotton which is being forced on the market comes from merchants who are settling last year's accounts.'"

The average price which will have been obtained by the South for the cotton crop of 1904-5 is probably not less than 8 3/4 to 9 cents a pound. As I have previously stated, this price shows to the producer a profit of probably at least 100 per cent. upon the cost of production, and yet in the face of this enormous profit an effort is being made to do what? One would naturally suppose that it would be to increase the profit through increasing the output; but no; the programme is to reduce the acreage 27 1/2 per cent., the fertilizers from 30 to 40 per cent., and in some portions of the South it has been seriously proposed that cotton should be burned rather than sold at below ten cents a pound, while others have suggested that the boll weevil should be introduced into sections in which it has been previously unknown to the end that the production of cotton might be reduced and the price enhanced.

During the twelve years ending September 1, 1902, the average price of middling cotton in New York was 7.69 cents, probably the equivalent of about 7 cents per lb., in the South. During the fourteen years ending December 31, 1904, the assessed valuation of property in the Southern states increased $1,686,000,000, and as far as any available statistics afford an indication, there is no single year since the war in which, irrespective of the price of cotton, its most important product, the South has not grown richer. This would seem to be rather strong corroborative evidence of the claim that even at 5 cents a lb., there is a profit in the production of cotton. The area at present devoted to its cultivation in the cotton states is about 30,000,000 acres. The total area of the cotton states is 303,241,000 acres, of which possibly one-half, or 151,620,500 acres is probably available for cotton culture.

An abundance of cotton would be a boon to civilization. Of the total American cotton crop some four million bales, or over 40 per cent., are consumed in America and our manufacturers have as yet hardly made an impression upon the foreign markets. In 1904 we exported only $22,500,000 worth of cotton manufactures of all sorts, and we imported $49,500,000. We grow three-fourths of the cotton in the world and yet we import twice as much manufactured cotton as we export. The total exportations from all countries of cotton manufactures is $653,000,000, of which we export a beggarly $22,500,000.

It is evident that most of all the United States would be benefited by lower prices for cotton and yet the fixed purpose of those who produce it is to enhance the price and to decrease the production. As a man of Southern parentage and a close student of economic progression, I have been greatly at a loss to understand the persistence of the South in the advocacy of this economical suicide. Reluctant as I am to admit it, I can only conclude that it is in a great measure a survival of the same spirit that led to a war for the maintenance of slavery, as the attempted maintenance of slavery was in itself the outgrowth of the idea that the tenure of the cotton monopoly depended upon the legal right to enslave the negro. It required a war which cost more than the entire value of the slaves in dispute to dissipate the former fallacy, and from the intensity of feeling which has been aroused throughout the South because of a decline in cotton to seven cents a pound, an economic struggle, which has cost the South dearly this year and promises to cost it still more dearly next year.

has been precipitated. It is well in such a situation to remind our Southern friends that combination in behalf of exorbitant profits has always provoked counter combination on the part of those whom it was sought to mulct, and it is to be hoped that the present issue will not be so far extended as to precipitate such a contest. If it is, the forces of progress and of sanity will in the end prevail, and the attempt which is being made to check the progress of industrial development in the cotton trade will result only in loss to its authors.

The cotton crop of the United States is probably less carefully cultivated and more wastefully handled than any other of our great staples. It is estimated by the closest students of the subject that intelligent methods of culture, picking and transportation would effect an economy of not less than 20 per cent., or probably not less than one cent a pound. The experiments conducted by the United States Government in the season of 1896-7 at its experimental farms at Auburn, Ala., Fayetteville, Ark., and Experiment, Ga., showed that cotton can be produced at a net cost of less than three cents a pound. If the South could be brought to realize, and in time it will be brought to realize, that its true policy is to decrease the cost of its production, and by so doing increase the demand for that production, a new era of prosperity will dawn for both the manufacturer and the planter, and the antagonism which is now assumed to exist between them will disappear in a community of interest which will enable them jointly to command the trade of an increasing civilization whose practically stationary consumption of cotton is almost the only unprosperous characteristic of an era of otherwise wonderful prosperity.

Mill News.

Those interested in receiving early and more complete investigated information of projected new mills, enlargements, improvements, fires, facts and gossip of the trade are referred to the Textile Advance News, issued weekly by the publishers of the Textile World Record, at $15.00 per year.

COTTON.

New Mills.

*North Carolina, Concord. The Brown Manufacturing Company has been incorporated with capital stock of $300,000 and will erect a 10,000 spindle mill. The main building will be 125 by 200 feet, one story, and will be operated by electricity. R. A. Brown, E. F. White and J. C. Wadsworth are interested.

*Pennsylvania, Lehighton. The Lehighton Lace Mill will start operations in a few days.

Pennsylvania, Philadelphia. It is reported that G. Zimmermann, Fairhill and Rockland Streets, is about to go into the manufacture of upholstery goods at this address. He has already purchased two looms which he will operate by gas power.

Pennsylvania, Philadelphia. Messrs. Eagles & Smith are about to start up in the manufacture of upholstery goods at Unity and Leiper Streets, Frankford, where they have installed one loom with another to follow in a few days.

Pennsylvanina, Philadelphia. James Newton's Primrose Tapestry Co. is very busy operating 4 looms on tapestry curtains, table covers and novelties, selling the goods direct and through New York. The plant is located at Oxford and Josephine Sts., Frankford.

Pennsylvania, Philadelphia. William Hookes has recently started up a plant for the manufacture of Turkish towels at 4300 North Franklin Street. He operates six looms by steam and sells the goods direct.

Pennsylvania, Philadelphia. Messrs. Cookson Brothers & Smith have started up a small plant for the manufacture of padding cloths at Nutter & York Sts., where they are operating 4 broad looms by steam, selling direct.

Enlargements and Improvements.

Connecticut, Shelton. The Adams Manufacturing Co. is utilizing one of the newly acquired buildings for a finishing department. A new five-story brick storehouse and a large boiler house will be built.

*Georgia, Athens. The reorganization of the Athens Mfg. Co. is complete and before long the new machinery will be installed. Operations are expected to start about August 1st making yarns, 20s to 30s, single and ply, skeins and warps. They will not operate the 300 looms in an adjoining building at present. Yarns will be sold through Schell, Taylor & Longstreth, Philadelphia. T. P. Vincent is president of the company; A. D. Cheney, secretary, and L. B. Thomas, general superintendent.

Georgia, Dalton. Work will start at once on erection of an addition to the Crown Cotton Mills. About 2,500 new spindles and 75 looms will be installed.

Georgia, Pelham. Contract has been awarded by the Pelham Manufacturing Co. for additional machinery in the carding and spinning departments.

Maryland, Warren. About 20 new looms are being installed in the Warren Manufacturing Company's plant.

Massachusetts, Fall River. Work has been started on an addition 74 by 222 feet, one story, between Nos. 1 and 2 mills at the Globe Yarn Mills of the New England Cotton Yarn Co. Spinning and finishing machinery will be installed.

Massachusetts, Fall River. It is reported that the Mechanics Mills contemplate replacing mules with ring spinning.

Massachusetts, Fall River. The Bourne Mills have placed order for 15,000 spindles to take place of discarded mules.

Massachusetts, New Bedford. The Butler Mill Co. is to instal a new engine (ordered) with driving capacity of 1,300 kilowatts, which will complete the power equipment of the plant. At present 65,000 spindles are in operation, but this number will be increased to 76,000 after new engine is in place.

New Hampshire, Manchester. The Manchester Mills are to install 20 more (Manning) boilers and build a large brick smoke-stack.

New York, Amsterdam. An addition will be made to the No. 5 mill of the A. V. Morris & Sons' plant. When completed machinery for spinning will be installed giving the plant a total weekly production of 60,000 pounds cotton yarn.

North Carolina, Charlotte. It is reported that the Magnolia Mills contemplate building an addition to their plant.

*North Carolina, Gastonia. The Modena Mills have held meeting recently and decided to start work at once on the new mill proposed some time ago. It will be 150 by 75 feet, two stories high, and will be known as mill No. 3. Plant will accommodate 10,000 spindles but only 8,000 will be put in at first. It is expected to have the new mill ready to start operations before cold weather.

*North Carolina, Greensboro. The Revolution Cotton Mills will start operations about June, 1905, in their new addition, in which 15,000 spindles and 400 looms will be installed. Mill is now running on canton flannels.

North Carolina, Hickory. The E. L. Shuford Manufacturing Co. is reported as contemplating addition of 7,600 spindles and 200 looms.

North Carolina, Mt. Holly. It is reported that the Mt. Holly Cotton Mills contemplate installing new machinery.

Pennsylvania, Philadelphia. Messrs. Stearns & Castor, the well known mill architects, located in the Stephen Girard Building, 12th Street, above Chestnut, have just prepared the plans for a two-story addition 52 by 111 feet, to the factory of Weimar Brothers, manufacturers of narrow fabrics at Amber and Abigal Streets. Several builders are now estimating on same and the operation will be started as soon as satisfactory terms can be made.

Pennsylvania, Philadelphia. The Aberfoyle Manufacturing Co., Chester, has purchased the plant formerly operated as the Harmony mills and will instal about 200 looms for making same class of goods as made at Chester.

Rhode Island, Pawtucket. A new three-story brick mill, 528 by 108, is to be erected for the Royal Weaving Company.

*Rhode Island, Pawtucket. Contract has been awarded for erection of the new mill for the Smith Webbing Company. The building will be 180 by 107 feet, with a 107 foot extension, one story. Electricity will be the motive power.

Rhode Island, Valley Falls. The Samoset Co. is making extensive improvements in their Cumberland Mills. These changes include the installation of new revolving flat cards. The Howard & Bullough American Machine Co., Pawtucket, R. I., is now delivering and erecting these machines.

South Carolina, Greenville. Additional machinery, consisting of 76 (Draper) looms and 4,200 spindles, have been installed in the Mills Manufacturing Co.'s plant.

South Carolina, Anderson. A new dye house has been completed for the Townsend Cotton Mills.

South Carolina, Camden. The Pine Creek Mfg. Co. is extending their system of humidifiers, installed by the American Moistening Company, Boston, Mass.

Mills Starting Up.

*Alabama, Jacksonville. The Ide Cotton Mills have begun operations in full.

*North Carolina, Burlington. Operations have been started by the Hopedale Mills Co. in plant formerly known as the Juanita Cotton Mills. This company is capitalized at $100,000. J. N. Williamson, Jr., is president of the company; Lynn B. Williamson, treasurer, and C. E. Beale, superintendent. They manufacture yarns, single and ply, 10s to 20s, operating 6,000 spindles. Sell product direct.

*North Carolina, Greensboro. The White Oak Cotton Mill will start spinning the latter part of this month and it is expected that goods will be ready for delivery by June. This plant will be operated exclusively on denims, making higher grade goods.

Texas, Hillsboro. Operations have been resumed in the Hillsboro Cotton Mills. Albert T. Clifton, formerly with the West Cotton Mills, is now superintendent of the plant.

Mills Shutting Down.

Pennsylvania, Philadelphia. Messrs. O'Neill & Cooney, 1543 Ruan Street, manufacturers of damasks and lap robes on 21 looms, it is reported will retire from the business of manufacturing. They also ran a branch mill at Unity and Leiper Streets. Both plants are now shut down and will not be started up again.

Pennsylvania, Philadelphia. Noah Barlow, for many years located at 5309-15 Westminster Avenue, West Philadelphia, where he manufactured tapestries and chenille goods on 42 looms, reports that he is about to give up the business. The mill is now shut down and the building for sale.

WOOLEN.

New Mills.

Illinois, Chicago. The Boynton Wool Scouring Company has been incorporated with capital stock of $25,000. G. W. Boynton and John Alexander are the incorporators.

*Maine, Guilford. The M. L. Hussey Woolen

Co., capitalized at $100,000, propose having their new mill in operation about January, 1906. Work will start at once on erection of the buildings. They will manufacture woolen goods, operating 4 sets cards and 36 looms and will also do their own dyeing. Chas. D. Shaw is president of the company; M. L. Hussey, treasurer; John Houston, agent, and A. C. Houston, superintendent.

*Maine, Limerick. The Limerick Mills have been incorporated with capital stock of $100,000. John F. Moore is president of the company; Charles G. Moulton, treasurer and Robert Halford, superintendent. They will make worsted yarns, 36s and below, operating 2,000 worsted spindles and using the Bradford system. A dye house is also attached to the plant. Product is sold direct.

Massachusetts, Newton. The Newton Woolen Co. has been formed with J. J. Healy as agent, to manufacture 10 run and coarser yarns. They will start operations May 1st, with 6 sets of cards. Will sell product direct.

*Massachusetts, Saugus. The larger part of the machinery in the Saugus Manufacturing Company's plant has been put in operation. Busch & Co. are selling agents for the mill.

*Michigan, Detroit. The new woolen mill to be started here by Aikman and Herbert Armstrong, will not be in operation before summer. The machinery has been ordered and will be placed in position as soon as received.

*New Jersey, Somerville. The Laurel Manufacturing Co., which has leased building here, will operate 50 broad looms on men's wear. Gould M. Coit is president of the company; H. L. Wissing, secretary and treasurer; Chas. Wink, general manager, and Fred Wink, superintendent.

*New Jersey, Somerville. The Laurel Manufacturing Co., about which details have recently been given, will manufacture worsteds, fancy and piece dyes, for men's wear and dress goods.

Oregon, Portland. A wool scouring plant is to be located here by Thomas Ross, of Las Vegas, New Mexico. The plant will have capacity of 50,000 pounds daily.

*Pennsylvania, New Bethlehem. The New Bethlehem Woolen Co. is operating the plant formerly run by another concern, on blankets, flannels and yarns. Andrew Kilgour is agent and superintendent of the mill, equipped with one set cards and 5 broad and 2 narrow looms. A dye house is also attached. Product is sold through Wm. Taylor Stearns.

Pennsylvania, Philadelphia. The Shetland Worsted Mill is a new concern which will start operations about May 1st, at Wakefield Street, Germantown, manufacturing worsted goods. F. N. Rigg, F. W. Simons and S. D. Worthington are interested.

Pennsylvania, Philadelphia. One of the new concerns recently started in Frankford is Messrs. Rhodes & Dyson, who are operating 3 looms on art squares in the O'Neill Mill at Oxford and Josephine Sts., selling the production direct.

Pennsylvania, Philadelphia. The Canterbury Carpet Co. has been incorporated with capital stock of $20,000. They operate a plant at Howard Street and Lehigh Avenue, running 30 looms, on ingrain carpets. Clement Read is president and superintendent of the plant; Edward C. Read, Jr., treasurer, and John L. Hooker, secretary. They have acquired plant formerly run by E. C. Moore & Co.

Pennsylvania, Philadelphia. The Crix Company is one of the new concerns which has recently been incorporated for the purpose of manufacturing men's wear worsteds. The plant is located at Howard and Lehigh Avenue, where it is operating 50 looms. The officers of the company are: President, Robert F. Shaen; agent, Robert H. Shaen, and superintendent, Thomas Whitehead. The company reports a good business and sells its goods direct. Mr. Robert H. Shaen is the buyer.

*Rhode Island, Bristol. Eight new looms have been received for the Namquit Worsted Mills.

*Rhode Island, Pascoag. Work is nearing completion on the Clear River Mills new plant. The main building is 150 by 54 feet, two stories. The Clear River Company has been incorporated with J. A. King, president, and C. F. Potter, Bridgton, treasurer, to operate the dyeing and reeling departments. As previously stated the Falcon Worsted Co., formerly at Mapleville.

Enlargements and Improvements.

*Canada, Way's Mills. The Barnston Woolen Mills contemplates resuming operations in May with greater capacity than before the plant was burned.

Connecticut, Norwich. The Reliance Worsted Company is remodelling the large round house, formerly used for storage, for manufacturing purposes.

Connecticut, Rockville. A large addition, 175 by 55 feet, four stories, brick, will be built this summer for the Hockanum Manufacturing Company.

Georgia, Atlanta. The Southern Rug & Carpet Co. is to install a dyeing plant with capacity of 2,000 pounds daily, in the plant.

Maine, Dexter. The Wassookeag Woolen Company is to build an addition of two stories to the mill.

*Maine, Madison. The new spinning machinery is being placed in the Indian Spring Woolen Mill.

Maine, Sanford. The Maine Alpaca Company is negotiating for purchase of the American Automobile & Power Co.'s idle plant, for purpose of installing 120 looms for manufacturing linings.

*Massachusetts, Auburn. The Ettrick Mills will erect a new mill building 250 by 106 feet, also an addition 60 by 40 feet to the spinning mill. The new building which they propose having completed in June will be equipped with 50 additional looms for manufacturing Wilton and body Brussels carpets. Some new spinning and drawing machinery will also be put in.

*Massachusetts, Charlton City. Plans have been prepared for a new mill, 115 by 50 feet, two stories, to replace the Aldrich Manufacturing Co.'s plant, destroyed by fire in March.

Massachusetts, Lowell. A new building, for which plans have already been prepared, is to be built by the Massachusetts Mohair Plush Co.

*Massachusetts, Lowell. We learn upon investigation that there is no truth in report of the Massachusetts Mohair Plush Co. erecting a new building.

Massachusetts, Millbury. Molt Bros., proprietors of the Indigo Blue Dye Works, are remodeling part of their plant for scouring and carbonizing purposes. New scouring machinery and a new Sargent automatic dryer are being installed.

*Massachusetts, North Andover. The Brightwood Manufacturing Company contemplates erecting a new building, 160 by 60 feet, two stories and basement, on Sutton Street.

*Massachusetts, Uxbridge. Davis & Brown Woolen Co., which has been operating the Capron Woolen Company's plant under lease since failure of the latter company, have purchased same. It is stated that a number of improvements will be made to buildings and equipment.

New Hampshire, Ashland. R. H. Hart has purchased 12 looms from the Laconia Woolen Mill.

*New Jersey, Passaic. We have been advised by the Pitkin, Holdsworth Worsted Co. that they have been erroneously reported to enlarge the plant.

New Jersey, Passaic. It is reported that Pitkin, Holdsworth & Co. propose enlarging plant double its present size.

Ohio, Ravenna. The Ravenna plant of the Cleveland Worsted Mills is to be enlarged and capacity increased. They will change from steam to electricity.

Ohio, Zanesville. Work has been started on erection of a brick addition, two stories, 24 by 60 feet, for the Zanesville Woolen Mill Company.

Ontario, Guelph. The Guelph Worsted Spinning Co. has increased the capital stock from $40,000 to $200,000.

Pennsylvania, Bristol. The Bristol Worsted Mills have recently installed a new set of combs and drawing and new twisters.

Pennsylvania, Craigsville. J. Alexander Ross & Co. expect to have their No. 2 mill in operation shortly making fine all wool bed blankets exclusively.

Pennsylvania, Philadelphia. Julius A. Gebauer, manufacturer of worsted and mixed men's wear on 33 looms at Unity and Leiper Streets, has recently ordered 27 new looms which he will install in the rooms formerly occupied by Francis A. Bruner in the same mill.

Pennsylvania, Philadelphia. The Fowler Waste Manufacturing Co. will add new garnett and picking machinery.

Vermont, Johnson. I. L. Pearl has sold his interest in the woolen mill here to Mr. Barrows, of Littleton, N. H. The new proprietors, Pearl & Barrows, will build an annex, 30 by 60 feet, and double present capacity of the plant.

Vermont, Saxton's River. The Saxton's River Woolen Mill has installed nine new looms.

Vermont, Springfield. The power plant at W. H. H. Slack & Bro.'s shoddy mill is being enlarged. They are installing new boilers and a 400 h. p. Allis & Chalmers engine.

Mills Starting Up.

Maine, West Buxton. Operations will be resumed about May 1st in F. H. Hargraves' mill, which has been closed for the past month owing to illness.

*Massachusetts, Adams. The Graham & Clark Woolen Mill, which has been idle for the past few weeks, has been put in operation by Geo. F. Sayles, the receiver.

New York, Honeoye Falls. Operations have been resumed in Hunt's Woolen Mill, which has been idle for several months.

*Oregon, Bandon. Operations are expected to start about May 1st in the new plant of the Bandon Woolen Mills, which will have equipment of 3 sets cards and 14 looms J. F. Lever is superintendent of this mill.

Mills Shutting Down.

*Maine, Gardiner. The mill formerly operated by the Cobbosseecontee Woolen Company is being dismantled.

Massachusetts, Uxbridge. The John R. & C. W. Scott Woolen Mill will be closed May 1st, for purpose of making some changes. The machinery in the card room will be transferred to the spinning room and the spinning machinery removed to the weave room, making it more convenient It has not yet been decided about installing additional looms

Pennsylvania, Philadelphia. Clayton G. Rice, proprietor of the Harmony Mills, is disposing of the plant.

For Knitting Mill News, see Knitting Department.

SILK.

New Mills.

*New Jersey, Paterson. The new silk mill recently started here by Chas. E. Mueller is equipped with 6 looms, making ribbons. Goods are sold through E. L. Heleker.

New Jersey, Paterson. The C. A. Cooper Manufacturing Co. has recently started operations in building at 98 Straight St., employing about 40 people.

New Jersey, Paterson. A new concern, known as the Weiss & Siena Company, has been started recently in the old Daggers Mills, corner Mulberry and River streets. They will employ about fifty people.

New Jersey, West New York. A new building is being erected here for the Hudson Silk Company. It is reported that the Sutro Bros. Braid and Silk Co. will also establish a plant at North Street and Hudson Boulevard.

*New York, Canisteo. Work has been started on construction of the new building for the Canisteo Silk Mill.

*Pennsylvania, Easton. Work has been started on erection of a new building for the Northampton Silk Company, recently incorporated with capital stock of $16,000. James Smith is president of the concern, E. J. Richards, treasurer; and H. J. Haytock, secretary and manager. They will manufacture broad silks, fine black taffetas, peau de soie, a specialty, starting with an equipment of 50 looms. Will sell product direct.

Pennsylvania, Jersey Shore. Raymond G. Buser is superintendent of the Jersey Shore Silk Mill, which will soon be put in operation. They are now installing 200 looms in the plant.

*Pennsylvania, Nanticoke. Work has been completed on the new plant for the Nanticoke Silk Throwing Co.

Pennsylvania, Towanda. Work has been started on foundations for the new mill to be erected for the Towanda Silk Mill Company, recently incorporated with capital stock of $40,000. W. J. Hartman is president of the company and manager; Moses O'Malley, vice president; W. H. Evans, treasurer, and E. P. Fuller, secretary. They will conduct a throwing plant. The new building will be 200 by 45 feet, one story.

Enlargements and Improvements.

Connecticut, Manchester. Matchett Bros., proprietors of the Springville Silk Mills, are to increase the capacity of the mill and are finishing off basement room at the factory for that purpose. New machinery, including looms, will be einstalled.

New Jersey, Paterson. Altshuler Bros. are removing their plant to the old Dale Mill, where the machinery will be increased.

New York, Binghamton. The Chenango Silk Company is to install 100 new looms in the plant.

New York, Buffalo. A new building, 200 by 50 feet, three stories, is to be erected for the Duffy Silk Co. Work will start at once on construction of mill, which it is proposed to have ready for occupancy by July 1st.

New York, College Point. Messrs. Oppenhym & Sons, proprietors of the Myhnepo Mills, have purchased property on 18th Street, upon which they contemplate erecting an additional building, 100 x 100 feet.

New York, Whitehall. The Champlain Silk Manufacturing Co. have had prepared for them by Philadelphia architects plans for a large extension to their present plant, where they are spinning silk yarns for weaving and knitting, etc. The plans are now ready and it is expected that the building will be commenced at once.

Pennsylvania, Allentown. The Joseph S. Mack Silk Company has purchased the Wm. R. Yeager building in South Allentown, and will equip same as a branch mill. The necessary machinery is being placed by the company which will occupy two floors.

*Pennsylvania, Allentown. Bids are being taken by Jacoby & Weishampel, architects, for the new silk mill of the Phoenix Silk Co. This building will be 486 by 54 feet, three stories high and will be of slow burning construction. A one-story power house and storage house will adjoin.

Pennsylvania, Duryea. The Dutton Silk Company has added ten new machines to the plant.

*Pennsylvania, Kutztown. If offer made by committee representing the York Silk Company is accepted by the bondholders, all the old silk machinery will be replaced with 125 new looms of latest type.

Pennsylvania, Scranton. The Paul Clemens Silk Mfg. Co. will instal 10 more warping machines in the new building, which is nearly complete.

Pennsylvania, Scranton. Reiling, David & Schoen have placed orders with the American Moistening Company for their Scranton, Pa., and Valley Falls, R. I., mills.

Mills Starting Up.

*Connecticut, Norwich. Operations have been started in M. J. Green's mill with about 60 looms. Thomas J. Green will be superintendent of the plant.

Pennsylvania, Topton. The new Hartley Silk Mills in this town were opened on April 19th in a most elaborate manner. The company furnished music and a large dinner to about 500 guests, citizens of the town, who were present to assist in the first operations of the plant.

MISCELLANEOUS.

New Mills.

*Georgia, Athens. Application has been made by the Southern Mfg. Co. to increase capital stock to $500,000 and charter asked for the Aberdeen Linen Mills, practically the same company and soon to start operations. Work is well underway on erection of the new mill, in which they expect to have the machinery installed by middle of summer.

Pennnsylvania, Philadelphia. The Stanley Manufacturing Co., with capital of $20,000 is about to put in machinery for the winding, twisting, spooling and coning of cotton, woolen, worsted and silk yarns, with an equipment of 10 twisters, 4 winders (cone) and ten spoolers. The proprietors are Charles Stanley and William Smith, who have rented quarters in the mill at Adams and Church Sts., where the machinery is now being put up and will be in operation within a few days.

Pennsylvania, Philadelphia. The Richmond Dye Works has recently been started at Howard and Thompson Streets, where they are dyeing cotton yarns, hosiery, plain mercerized cotton and artificial silk, making a specialty of sulphur blacks. Mr. Mark C. Notz is the manager.

Pennsylvania, Philadelphia. The Fibre Rock Mfg. Co. has been organized for purpose of manufacturing textile fabrics and materials and will soon be ready to supply the trade with asbestos yarns, fabrics, etc. The plant is located in Manayunk.

*Rhode Island, Cranston. The new plant of the Narragansett Finishing Co. is located at this place.

C. J. Obermayer is president of the company and T. P. Himes, treasurer. They dye and finish cotton linings.

Enlargements and Improvements.

Connecticut, Jewett City. Contract has been let to A. N. Carpenter for building the Jewett City Textile Novelty Co.'s new plant.

*Massachusetts, Millbury. The new machinery has been received for the West End Thread Mill and will be installed as soon as possible.

Massachusetts, Webster. A new flat roof will be put on the Stevens Linen Mill during the summer.

New Hampshire, Meredith. A new brick building, 28 by 32 feet, is to be erected for the Atlas Linen Company.

Pennsylvania, Allentown. The Liberty Dye Co., of Paterson, N. J., will establish a plant at this place. The old Midvale Foundry property has been purchased for the purpose.

FAILURES AND SUSPENSIONS.

New York, Seneca Falls. Harrison C. Chamberlain, proprietor of the Seneca Woolen Mills, has made an assignment to E. J. Rogers, of Geneva. The liabilities of the company are estimated at $160,000.

Pennsylvania, Philadelphia. Messrs. Moss & Webb, manufacturers of upholstery goods on four looms at 2632 Mascher Street, have made an assignment to James E. Mitchell Co., dealers in yarns. A schedule of liabilities and assets was not presented.

South Carolina, Walterboro. The Colleton Cotton Mills have been placed in the hands of a receiver.

FIRES.

Canada, Bolton, Ont. J. Walshaw & Son's mill in which they manufactured blankets and horse clothing on 3 sets cards and 15 broad looms, has been destroyed by fire incurring a loss of $50,000.

Canada, Montreal. The Montreal Blanket Co.'s mill has been damaged by fire. The loss is reported fully covered by insurance.

Massachusetts, Huntingdon. The Massasoit Woolen Mills have been destroyed by fire. It is stated that the proprietors propose leasing a building for purpose of completing orders and as soon as insurance is adjusted will rebuild the plant.

Massachusetts, Oxford. D. N. Taft's storehouse was destroyed by fire recently.

North Carolina, Shelby. The Burton Mills, owned and operated by the Lily Mill & Power Co., has been damaged by fire to the extent of $1,000.

Pennsylvania, Avon. The factory of Messrs. Light & Bomberger, in which they manufactured half hose on 25 machines, was completely destroyed by fire on the 19th of April. The loss is estimated at $15,000.

*Pennsylvania, Birdsboro. The Pine Hill Hosiery Mills recently destroyed by fire, will not be rebuilt.

Pennsylvania, Philadelphia. The mill in which Thomas Henry, Jr., manufactures carpet and upholstery yarns on 12 sets and 1500 spindles at Emerald and Willard Streets, was damaged by fire recently causing a loss of $2,000. This mill is a branch of the main factory at Madison Street, east of Kensington Avenue.

Tennessee, Trenton. Fire which started in the picking room of the Trenton Cotton Mill, caused loss of about $3,000 to building, machinery and cotton. Loss is covered by insurance.

FACTS AND GOSSIP.

Alabama, Huntsville. The Huntsville Bagging & Tie Co. has been incorporated with capital stock of $50,000 for manufacturing cotton bagging and ties. Isaac Schiffman is president of the company; Isadore Wind, secretary and Leo Cohen, treasurer.

Alabama, Rock Mills. The Wehadkee Cotton Mills have been sold to L. Lanier representing Boston capitalists, at receiver's sale held recently. This plant is equipped with 3,500 ring spindles and was run on coarse yarns.

Arkansas, Little Rock. B. C. Brownell, of Providence, R. I., is reported as corresponding with the Board of Trade relative to establishing a cotton mill here. It is stated that if part of the capital necessary is subscribed locally, eastern capitalists will supply the balance.

California, Los Angeles. Beeman & Hendee have incorporated with capital stock of $50,000, to manufacture embroideries, etc.

Canada, Toronto. The H. W. Corney Co. have been incorporated with capital stock of $40,000 to manufacture carpets, mattresses, etc. P. E. Hambly and A. K. Butchart are interested.

*Colorado, Denver. The project of recapitalizing the Overland Cotton Mills Co. has been abandoned and the mills are being dismantled.

Connecticut, Greenville. Frank Offord is reported as having designed a new towel and face cloth and will install the necessary machinery for manufacturing same.

Connecticut, Rockville. The Springville Manufacturing Company is to build an addition to the mill.

*Delaware, New Castle. It is reported that the Triton Mills have again been inspected by Philadelphia parties with view to putting same in operation.

Georgia, Athens. It is reported that John D. Moss contemplates establishing a plant for making braided cord, sash cord, webbing, etc.

Georgia, Atlanta. The Atlanta Bagging & Tie Co. has been incorporated with capital stock of $5,000. Emmett D. Walsh, Benj. Rosenthal and Edward W. Brown are among those interested.

Personals.

Cotton.

James McQuestion is the new overseer of the cloth room of the Boston Mfg. Co., Waltham, Mass., succeeding Patrick Dowd.

Henry Garratt will be the overseer of mule spinning room at the Dartmouth Mill, New Bedford, Mass.

J. Sumter Moore has been appointed general manager of the Olympia, Granby, Richland and Capital Mills, Columbia, S. C. His appointment follows the resignation of E. W. Thomas, who was the general manager of the Olympia and Granby mills.

William J. Underwood, who has been at the Parker Mill nearly nine years, has resigned to take charge of the mule room of the No. 2 Hargraves Mill, Fall River, Mass.

The Floyd Mill, Rome, Ga., is prospering. They have for superintendent R. L. Wilson, who is an up to date mill man. B. F. Pallard is overseer of the card room, with W. S. Johnson as his assistant. P. A. Smith is overseer of spinning. The mill is running on full time.

Noah Lemaire, of Taunton, Mass., has been elected assessor for three years, which will take him out of the mill business during that time.

The Acushnet Mill Corp., New Bedford, Mass., have placed a repeat order for humidifiers with the American Moistening Company, Boston, Mass.

John Gilligan, now of Charlotte, N. C., has been appointed superintendent of the Altamahaw Cotton Mills of Elon College, N. C. James C. Reid has resigned to take the management of the Meridian Cotton Mills of Mississippi.

P. D. Fortune has been chosen to succeed the late A. R. Steele as president and general manager of the Union Cotton Mills, LaFayette, Ga.

The Victoria Cotton Mills, Rockhill, S. C., have adopted the American Moistening Company's system of humidifiers.

George M. Smith, overseer of the weaving department of the Berkeley Mill, Berkeley, R. I., for nearly a quarter of a century past, concluded his labors with that concern recently.

John B. Allen has resigned as superintendent of the Centerville Cotton Mill, Centerville, R. I.

Byron F. Card, formerly of New Bedford, Mass., and more recently connected with a textile mill publication of Charlotte, N. C., has severed his connection with that paper, and will act as direct representative of Southern yarn mills in the North, and probably will locate either in New York or Philadelphia.

H. J. Haytock, who has been superintendent of M. J. Green's plant at Paterson, N. J., has resigned to accept a position in Easton, Pa., as superintendent of the Northampton Silk Co.

The Lanett Cotton Mills, West Point, Ga., have placed a repeat order for humidifiers with the American Moistening Company.

The Star Thread Mills at Athens, Ga., have placed a repeat order with the Howard & Bullough American Machine Co., Pawtucket, R. I., for improved spinning frames.

B. L. Amick has been made overseer of carding in No. 2 mill of the Odell Mfg. Co., Concord, N. C.

Henry A. Cobb of Grosvenordale succeeds William Merrill, resigned, as overseer of weaving at the No. 1 mill of the Manchaug (Mass.) Mills.

Arthur W. Etchells has been made superintendent of the branch mills of Murphy & Bro., at Chester, Pa.

Joseph Roy, overseer of the cloth room at the Eagle Mills, Woonsocket, R. I., has resigned in order to enter upon the office of assistant factory inspector, to which he has just been appointed.

Peter Fenton has accepted a position at Willimantic, Conn., and so has resigned as overseer of weaving at the Newmarket (N. H.) Mfg. Co.

F. W. Lavene has resigned his position as overseer in the finishing department of the Palmer Mill at Three Rivers, Mass., after twenty-one years service for the company.

Daniel Gee, dyer at the Springdale Finishing Co., Canton, Mass., has resigned. Rene G. B. Van Houdt succeeds him.

L. I. Guion has resigned as superintendent of the Columbia (S. C.) Mills of the Mt. Vernon Woodberry Cotton Duck Company, to accept a position with Wm. D'Olier & Co., Philadelphia, cotton yarn dealers, as their southern representative.

William Leclair, overseer in the Wamsutta Mill No. 5, New Bedford, Mass., severed his connection with the mill recently.

Edward S. Swift, assistant superintendent of the Bourne Mills, Fall River, Mass., has resigned and Raymond Murray has severed his connection with the mills. William Evans is now in charge as superintendent.

F. P. Pearson, manager of the Arnold Print Works, North Adams, Mass., has retired, and will move to Haverhill, Mass., his native place.

E. W. Thomas, formerly of Lowell, Mass., but more recently general manager of the Olympia Mills at Columbia, S. C., has resigned that position, to take the position of general manager of the various mills of the United States Cotton Duck Co., with headquarters at Baltimore, Md.

John B. Allen, who for the last 13 years has been superintendent of the Centreville (R. I.) Cotton Mill, has been succeeded in the position by Allen McNab. Mr. McNab has been in the Providence office of the B. B. & R. Knight firm.

Hiram Higham, it is reported, who is at present superintendent of the Wamsutta Mills 6 and 7, New Bedford, Mass., will succeed James O. Thompson,

Jr., as superintendent of the Wamsutta Mills. Mr. Thompson is to go to the Wampanoag Mills in Fall River.

Hon. Thomas A. Hall, who for the past 27 years has been superintendent of the two cotton mills at Rockville, R. I., will retire from mill duties on May 1st, and with his wife will go to reside at 96 Appleton Ayenue, Pawtucket, R. I., with his son Stephen T. Hall, who is foreman of the Speeder Fitting Department at the Howard & Bullough American Machine Co., Ltd., Pawtucket, R. I.

S. I. Roberts, superintendent of the Riverside Cotton Mills, Danville, Va., has resigned.

Frank D. Sawtelle, overseer of the spinning department of the Clinton Mill, Woonsocket, R. I., has tendered his resignation to accept a position with the Utica Steam & Mohawk Valley Mills, Utica, N. Y. M. J. Crowley of the Amesbury Cotton Co., Amesbury, Mass., has succeeded him.

William L. Spear, who has been employed at the Jackson Mill, Nashua, N. H., for about fifty years, the greater part of the time as overseer of the cloth room, has resigned. For a number of years he was superintendent of the Jackson Co.

Peter Fenton, overseer of the weaving in the mills of the Newmarket Mfg. Co., Newmarket, N. H., has resigned to accept one at Willimantic, Conn.

George C. Urquhart, a well-known resident of Pawtuxet Valley, has been appointed superintendent of the Pontiac Bleachery, Pontiac, R. I., to succeed Supt. Whittell, resigned.

B. F. Guy has resigned as superintendent of the Eufaula Cotton Mills, Eufaula, Ala.

Horace Salisbury, who has had charge of the spinning department at the Coventry Company's mill, Anthony, R. I., closed his labors there recently, and will retire from factory life for good. His successors are W. H. King and Harry Carpenter. The former, who has been secondhand of the ring spinning room, will have charge of that as a separate department, and Mr. Carpenter has charge of the mule room, the two departments, consolidated under the retiring overseer, becoming separate again.

Woolen.

E. A. Mansfield, who has been for a number of years superintendent of the Calumet & Hecla Mills, Uxbridge, has been engaged by the American Woolen Co. as superintendent of the Hecla Mill, which was purchased by them at a recent auction sale.

William C. Damon has completed his services as superintendent of the woolen mills of M. T. Stevens & Son, North Andover, Mass., and will go to New York to accept a position in the house of J. P. Stevens & Co. A. B. Day, of Haverhill, Mass., will succeed him.

William Beck of Worcester, Mass., has taken charge of the new Queensbury Mill, Olneyville, R. I. Mr. Beck goes from the main plant of the company at Worcester. This mill was formerly known as the Rhode Island Worsted Company. A little later in the season a large addition will be made to the mill.

M. C. Wetstein has succeeded James F. Fitton as assistant superintendent of the Rock Manufacturing Co., Rockville, Conn.

Harry Scott, foreman of the burling room of the Maine Alpaca Co., Springvale, Me., has resigned. Hiram H. Rowe has been promoted to fill the vacancy at the mill.

George Judson has resigned as overseer of finishing at the Cocheco Woolen Mfg. Co., East Rochester, N. H.

Thomas Burns has been made overseer of weaving at the Jefferson (Mass.) Manufacturing Company.

Edward J. Joyce has secured the position of overseer of carding at the Cavendish (Vt.) Woolen Mill.

John S. Fildes is now superintendent of the Dryden (N. Y.) Blanket Mills.

Samuel M. Lambert, formerly superintendent of the Taylor Woolen Co., Spencer, Mass., has been made superintendent of the Springfield (Ill.) Woolen Mills.

Robert Halford, who has been in charge of the yarn department of the Goodall Worsted Company, Sanford, Me., for fifteen years, is at the head of a new company being formed to take over the unoccupied Holland Woolen Mill at Limerick, Me., for the manufacture of worsted yarns.

George P. Newell has resigned the superintendency of the French River Textile Co., Mechanicsville, Conn.

Robert J. Irwin, for some time superintendent of the Scott Woolen Mills, Stottville, N. Y., has resigned, and taken up his residence in Hudson.

John S. Fildes has been appointed superintendent of the Dryden Blanket Co., Dryden, N. Y.

F. W. Seavey, of Bridgeton, Me., is in charge of the weave room of the American Woolen Company at North Vassalboro, Me. This room contains 110 looms.

William Scott, of Hyde Park, Mass., has accepted the position as superintendent of the Madison Woolen Mills, Madison, Me.

Alfred Hodgson has secured the position as designer with the Oakland (Me.) Woolen Co.

John Burns, for the past three years overseer of the weaving department of the Nasonville Mill, Nasonville, R. I., has resigned, and accepted his old position as overseer of weaving in the American Woolen Co.'s mill at Moosup, Conn.

A. L. Sprague has accepted the position of assistant superintendent and designer at the Bellevue Worsted Mill, Germantown, Pa.

James H. Hendry, formerly superintendent of Streetsville, Ont., succeeds T. B. Umpleby as superintendent at the John Dick (Ltd.) Woolen Mills, Seaforth, Ont.

H. E. Sykes has been appointed superintendent of the Schaghticoke (N. Y.) Mills Co. He was formerly with the Passaic (N. J.) Woolen Co.

C. H. Speak has accepted the position as boss

dyer with the Kennebec Mills, Fairfield, Me., of the American Woolen Co.

Joseph Budrough, for 30 years an employee at the Weybosset Mills, Olneyville, R. I., and for the past 26 years overseer of the spinning room, has severed his connection with those mills, as has also his brother, George Budrough, who has been at the mill 24 years and was assistant in the spinning department.

Frederick Kimball has resigned as superintendent of the Brigham Woolen Co., Danielson, Conn.

Harry Gill, late of the Burlington Mills, Winooski, Vt., has accepted position of boss dyer with the Springfield Woolen Mills at Springfield, Ill.

Albert Batley has resigned as overseer of the drawing-in department at the Assabet Mills, Maynard, Mass.

Deaths.

James Greenwood, one of the pioneer manufacturers of Germantown, Pa., and veteran of the Civil War, died at his home in Germantown recently. His spinning factory, on the banks of the Wissahickon, below Rittenhouse Street, was for years a landmark of the neighborhood. He was 66 years old at the time of his death.

George W. Stafford, one of the well known textile machinery manufacturers in the country, and a resident of Rhode Island, died March 29th at his home in Longmeadow in the 56th year of his age, after a long illness. Mr. Stafford was born in Salem, Mass., and in his early manhood was engaged in textile manufacturing work with several concerns. In 1881 he organized the George W. Stafford Manufacturing Company. This company was consolidated with the Crompton & Knowles Loom Works some years ago, and Mr. Stafford remained as general manager of the Providence plant of that company until about three years ago. He then left and organized the George W. Stafford Company, which located at Readville, Mass., and of this concern he was general manager at the time of his death. He was regarded as one of the authorities in weaving machinery of all kinds. Mr. Stafford took a great interest in charitable work. He leaves a widow and one son.

Levy Yanney, proprietor of the Yanney Mills of Ephrata, N. Y., died at his home April 12th. Mr. Yanney was 71 years old, and was known throughout the country as an expert in textile matters.

John Campbell, well known in the dyestuff business, after an illness of eight weeks with typhoid fever, at his residence in New York City, died April 11. He was born in Liverpool, England, in 1855, and spent his boyhood in Manchester. As a mere lad he started in the employ of a chemical works at Blackley, Manchester, and in a comparatively short time became their traveling salesman. In 1876 he was sent to Canada in the interest of the firm, where he introduced, for the first time in America, Blackley Blue. This undertaking was so successful, that in the following year he was sent to New York City, where he opened an American branch of the English firm. He was subsequently admitted to partnership, and in May, 1888, became the sole owner of the American branch of the business, which was thereafter known as John Campbell & Co. His genial disposition and rare faculty of forming enduring friendships contributed largely to his success. The business will be continued as heretofore upon the lines laid down by its late founder.

A. R. Steele, president and general manager of the Union Cotton Mills, LaFayette, Ga., died March 30th. Mr. Steele was born in Lynwood, Scotland, in 1833. He came to this country in 1854, and went to work in the Augusta Factory, Augusta, Ga. Beginning life as a sweeper boy in the mills of his native country, at the age of 13 years, he remained steadily in the cotton mill business to the day of his death, having filled, with ability, every position from sweeper up.

William H. Micou, assistant treasurer of the J. Spencer Turner Company, New York, died recently, at the age of 50 years. He has been with the Turner Company since 1901, and formerly was connected, for many years, with the Tallassee Falls (Ala.) Manufacturing Co.

Thomas S. Barraclough, well known in the wool business throughout the country, has accepted the position of wool buyer for the Pacific Mills, Lawrence, Mass., to succeed the late Joseph Walworth. Mr. Barraclough has been a resident of Lawrence for many years. He learned the wool business at the Pacific Mills, where for some 20 years his father was overseer of the wool shop. Mr. Barraclough then went to St. Louis, where he was employed in the same business for several years, and returning to Boston about 11 years ago, he accepted the position of wool buyer for the firm of Koshland Bros., which position he has since held.

Francis Cabot, for many years closely identified with the cotton manufacturing interests of New England, and especially the Cabot Mfg. Co., died April 10th at his home in Brookline, Mass., after a short illness. He had not been in active business for some little time.

Alexander D. Brown, of Newburyport, Mass., aged 83 years, died at his home April 22nd. He was born in Newburyport and began his business career at the old Bartlett cotton mill. A few years previous to 1860 he was appointed paymaster at the Globe Cotton Mill and from 1860 to 1869 was its treasurer. A year later he engaged in the cotton brokerage business in Boston, which has continued to the present time, the firm now being A. D. Brown & Son.

Joseph Walworth, wool buyer of the Pacific Mills, Lawrence, Mass., died at his home in that city recently. He had held the position with the Pacific Mills 42 years, and was as well known in wool circles on the other side of the Atlantic as in this country, and was one of the best authorities on wool. He was born in England in 1831, and came to this country in 1850. Mr. Walworth was a self-made man of the highest type. From his earliest years he had always been interested in the things which go to make good citizenship. He is survived by his wife and four children.

Albert Pratt, for 33 years connected with the Lonsdale Co., Lonsdale, R. I., died April 7th in Pasadena, Cal. In 1866 he went to work for the Lonsdale Company, being made assistant superintendent in 1874. He retired in May, 1900.

New Publications.

[Any work noticed under this head can be obtained through the office of this journal.]

Cotton Seed Products; by Leebert Lloyd Lamborn; 240 pages, 6 by 9; D. Van Nostrand & Co., New York City. Price $3.00.

This book deals with the extraction of the oil from the seed and the utilization of the products from the seed. The author has adapted it to the technical student, the practical man in the fat and oil industries, the cotton seed miller and the consumer of cotton seed products. Following is an abstract of the table of contents: The cotton plant; the cotton seed industry; utilization of cotton seed; cotton seed products; oleomargarine and lard compound; soap and soap powder; cotton seed meal.

Alternating Current Machinery; by William Esty, S. B., M. A.; 412 pages, 6 1/2 by 9; American School of Correspondence, Chicago, Ill. Price $3.75.

This book is intended to give the practical man of limited education as complete a treatise on alternating current machinery as is possible without the use of mathematics beyond trigonometry. It is freely illustrated and will doubtless prove of value to the class of students for whom it is written.

Wool, Cotton and Silk from Fibre to Fabric; by E. A. Posselt, Philadelphia, Pa.; 408 pages, 7 1/2 by 11. Price $7.50.

This work is divided into nine sections. The first treats of the characteristics of fibres, their place of origin, methods of production, etc. Under the head of preparatory processes various macrines are illustrated and described in detail. The same may be said of the succeeding sections which are devoted to different processes of textile manufacturing. The author describes machines and processes that have been brought out in this country and abroad. A separate chapter is devoted to knitting.

The dyeing, bleaching and mercerizing processes are treated as thoroughly as the other departments. In addition to the section on dyeing machinery there is a chapter devoted to dyestuffs and chemicals, which includes a list of the various dyes for cotton, wool, silk and jute, classified according to the method of application. The finishing processes and machinery are considered in detail. The work concludes with a section on power, treating of power plants, transmission of power and lubrication.

Cellulose Industries in the United States, by A. D. Little, Boston, Mass. Reprinted from the fifth International Congress of Applied Chemistry, Berlin, 1903.

An account of the American cellulose industries prepared by one who has had years of practical acquaintance with this branch of the business. It gives a general idea of the magnitude of the cellulose industry and will repay careful reading.

The Italian in America; by Eliot Lord, A. M., John J. D. Trenor, and Samuel J. Barrows; 257 pages, 8 by 5; B. F. Buck & Co., New York City. Price $1.50.

This book, written by the special agent of the United States tenth census, the chairman of the immigration committee and the secretary of the Prison Association of New York, tells us about the Italian immigrant, not as he is found in the cities, but as he becomes when settled in the country tilling the soil. The authors have evidently made a sincere attempt to present the facts as they find them and their story gives the reader a very different opinion of the Italian immigrant from the prevailing one. The first chapter tells of the flow of immigration, then follow others on the inheritance and progress of united Italy, the regulation of Italian immigration, Italian settlements in American cities, the Italian in competition and association, in the mining field, on farm and plantation, the demand for Italian labor, the call for better distribution, pauperism, disease and crime, progressive education and assimilation, and the privileges and duties of Italian-American citizenship.

There are several illustrations of the plantations that are being worked by Italians in various parts of the country. Those showing the cotton fields are of special interest at the present time when the memory of the threatened cotton famine of last year is so fresh in the minds of all.

Cotton Spinning; by Robert Cornthwaite; 105 pages, 4 1/2 by 7; John Heywood, Manchester and London. Price 75 cents.

This is intended as an overseer's handbook of spinning, and is divided into seven sections with the following titles: Master and man; cotton and its treatment; counts and strength of yarn; working particulars; aids to efficiency; economic use of stores; tables of weights and measures. Each section is divided into what might be called a number of short talks, each dealing with a particular subject. The writer addresses the reader in a conversational style and in this way a great deal of useful information is easily imparted. The author is a practical spinner, having been manager for John Dewhurst & Son, Skipton; the Nevsky Sewing Cotton Co., St. Petersburg, and J. & P. Coats' Spinning and Sewing Cotton Mill, Torelleo, Spain. Every cotton manufacturer and worker will find the book of great value.

Spinning and Twisting of Long Vegetable Fibres (Flax, Hemp, Jute, Tow, Ramie); by Herbert R. Carter; Chas. Griffin & Co., London; 353 pages. Price $5.00.

There are very few works treating of the subjects covered by this book, which will therefore be welcomed by the trade interested in the spinning of long fibres. Beginning with a brief but very comprehensive account of the long vegetable fibres of commerce the author takes up the mechanical processes, describing and illustrating them in a remarkably clear and concise manner. An abstract of the table of contents follows: Raw fibre markets; preliminary operations; hackling, carding, mixing; drawing, doubling, spinning; yarns, twines, threads; roving frames; dry and wet spinning, spinning waste; reeling, winding, drying, cooling and bundling yarns; manufacture of threads, twines and cords; ropes; mechanical department; mill construction; boilers, power transmission, etc.

Business Literature.

Filtration; Greer Filter Co., Philadelphia, Pa.

An attractive catalogue illustrating and describing various plants installed by the above named firm.

Fan Motors; Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

The approach of hot weather recalls to manufacturers the necessity of ventilating and cooling workrooms and offices. This booklet, describing and illustrating the fan motors built by the Westinghouse Electric and Mfg. Co., is therefore a very timely addition to business literature.

Some New England Dividend Payers; The Green Fuel Economizer Co., Matteawan, N. Y.

This pamphlet opens with the announcement that the Green Fuel Economizer Co., manufactures a complete line of fans, blowers, heaters and exhausters for all general purposes and which have as high a reputation as the Green economizer. There is also a long list of New England companies using the products of the Green Fuel Economizer Co., and a list classified as to states, the whole making an impressive showing.

Buffalo Disk Wheels; Buffalo Forge Co., Buffalo, N. Y.

A mailing card which calls attention to Buffalo disk wheels by means of some attractive illustrations and reading matter.

The Monarch Engine Stop; Consolidated Engine Stop Co., New York City.

A new catalogue issued to call attention to the Monarch engine stop and speed limit system, which are in extensive use throughout the country in preventing many of the accidents which are unavoidable without them. The catalogue is freely illustrated and in addition to the descriptive matter there is a long list of users throughout the country, which, however, includes but a small part of the total number.

Southern Railway Textile Directory.

The Land and Industrial Department of the Southern Railway have issued their annual report and directory of mills in the territory tributary to the Southern Railway on January 1st, 1905, comparing the equipment of looms and spindles on that date with the figures on January 1st, 1903. The great bulk of the textile business in the South is located in territory reached by the Southern Railway. A summary of the figures shows that out of 7,360,000 spindles in the Southeastern States, 6,450,000 are in territory covered by the Southern Railway.

Plants and Types, National Electric Co., Milwaukee, Wis.

A very attractive pamphlet showing the products of the National Electric Company by a series of thirty-one illustrations, including complete power plants as well as individual machines.

Soft Water; Greer Filter Co., Philadelphia, Pa.

In this pamphlet the Greer system of softening water is described. It will prove of interest to textile manufacturers generally.

G. Hilscher Establishes Philadelphia Branch.

Manufacturers of full fashioned hosiery and others about to engage in the manufacture of this class of goods will be interested to learn that G. Hilscher, the well known builder of this machinery in Chemnitz, Saxony, Germany, is about to start an office in this country. Edward W. Koch, who will have charge of this business for Mr. Hilscher, will have his office at the Northeast corner of York and Jasper Street, Philadelphia, at which address machines can be seen in operation and manufacturers will have an opportunity of examining the class of goods which can be turned out on them.

Textile Education by Mail.

The textile department of the International Correspondence Schools will shortly enter upon the eighth year of its usefulness. Originally established as the American Correspondence School of Textiles by Mr. C. P. Brooks, who now directs the work, the undertaking was later merged with the International Correspondence Schools of Scranton, Pa., and conducts textile education in cotton and woolen manufacturing, designing and many other textile branches, from New Bedford, Mass.

This institution has been an unqualified success from the beginning, having many thousands of students, not only in the United States but in Canada, Mexico, Europe and Asia. We are informed that there is not a cotton nor a woolen mill of importance in the United States that has not one or more students receiving instruction from New Bedford by mail, and in many cases large clubs have been formed in each mill comprising the leading overseers, second hands and others who are studying together to advance their knowledge of the mill business.

Information as to the various courses of instruction and illustrated catalogues can be obtained from the Department of Textiles of the International Correspondence Schools, New Bedford, Mass.

Dixon Crucible Meeting.

OLD BOARD OF DIRECTORS AND OFFICERS RE-ELECTED.

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company the old board, consisting of Edward F. C. Young, John A. Walker, Edward L. Young, William Murray, George T. Smith, Joseph D. Bedle and George E. Long, was unanimously re-elected. The board of directors re-elected the former officers, namely, Edw. F. C. Young, president; John A. Walker, vice-president and treasurer; George E. Long, secretary. Judge Joseph D. Bedle was also re-elected as counsel.

The stockholders present expressed themselves as thoroughly satisfied with the management of the company by its officers.

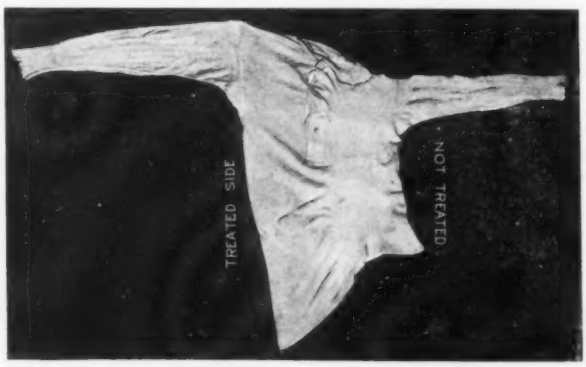
Of the total number, 7,345 shares, there were represented 7,145 shares.

Technical Advertisers Organize.

The advertising representatives of a large number of concerns engaged in the manufacture of machinery and allied industries have formed an organization to be known as the Technical Publicity Association. The first annual meeting, dinner, and election of officers was held in the rooms of the Hardware Club in the Postal Telegraph Building, New York City, on the evening of April 27th. An address was delivered by E. P. Harris.

The "Nevershrink" Process for Wool.

The accompanying cut illustrates the merits of the "Nevershrink" process, invented by C. Scott Althouse, Reading, Pa. The cut shows an undershirt half of which was treated with the process, and the other half remaining intact. The shirt was fulled very hard. The portion which was subjected to the "Nevershrink" process did not shrink at all.



while the other half of the shirt is like a piece of felt. This test of the process demonstrates the simplicity of its application, and shows the nonshrinkable properties of the treated fabric. It would be impossible to shrink only half of a shirt without felting the whole garment. It is stated that the fibre treated with the "Nevershrink" process shows no difference whatever under a powerful microscope, that in fact it is impossible to distinguish a treated fibre from a nontreated one, there being no change in the physical structure.

Further information can be obtained from Chas. H. Heyer, 1501 Real Estate Trust Building, Philadelphia, Pa., who is the general sales agent for the process.

Boston Office.

The S. P. Wetherill Company, manufacturers and importers of Indian, Tuscan and Venetian reds, umbers, siennas, ochres, purple browns, metallic oxides and copperas, barytes, Paris white, whiting, talc and soapstone, have opened an office in Boston and have been fortunate enough to secure the services of Spencer J. Steinmetz as manager. Their address is 161 Devonshire St.

Gill and Comb Pins.

The business of John M. Dean, whose shop is located at the corner of Tanner and St. Hyacinth Sts., Lowell, Mass., is constantly on the increase. He manufactures a line of hackle, gill, card and comb pins, comber needles of all sizes, carrying combs, porcupine rolls, tenter plates, gills, fallers and flat pins of every description, and is recognized as an authority in that particular line. This business has been established five years. Mr. Dean is a practical mechanic with a large and varied experience in English and American shops, and is well trained in this particular direction. He has associated with him his son, Charles E. Dean, who looks after the work pertaining to the combs. They have recently added new machinery to their plant, which will about double their capacity. Their product is well known to the trade and they have among their customers a great many of the mills in the New England, Middle and Western States.

The Good Old Summer Time.

When and where to go for a vacation is a question which perplexes us all. There are beautiful places in every section of the country, but to reach them at a moderate rate and within a reasonable time is a great barrier.

New Jersey has bounded to the front as a summer resort and well she might since her shore is within reach of all. Her attractions are too numerous to mention, and the accommodations provided for the tourist being unequaled anywhere in the land. The famous beach resorts of New Jersey are Atlantic Highlands, Seabright, Long Branch, Asbury Park, Ocean Grove, Belmar, Spring Lake, Sea Girt, Point Pleasant, Atlantic City, Ocean City, Cape May, and Beach Haven. Each is unique in environments and caters to the best class of summer travelers. Every convenience is at hand for genuine enjoyment and each can be reached by rail or boat, the lines are both operated by the New Jersey Central and C. M. Burt, G. P. A., 143 Liberty Street, New York, has issued an illustrated brochure detailing the beauties and advantages of the above resorts and a hundred others. This book will be sent to any address upon receipt of six cents in stamps, and one looking for a vacation region would do well to send for it.

The Birdsboro Steel Foundry & Machine Co.

This company, which was formerly called the Diamond Drill & Machine Co., is located at Birdsboro, Berks Co., Pa. The change is merely in name, as the same lines will be manufactured. This company will continue to make diamond drills and take contracts for prospecting. Some of its other products are open hearth steel castings, air furnace iron castings, semi-steel castings, cupola castings, machine moulded steel gears, machine moulded iron gears, cast steel pipe fittings, high pressure steel fittings, rolling mill machinery, hydraulic machinery, punches and shears, slitting shears, Wagner cold saw cutting-off machines, Jackson belt lacing machines, etc.

Every department of the plant is extremely busy and there are enough orders on the books to keep the works running night and day for some time to come. The Birdsboro Steel Foundry & Machine Co. desire to thank the many patrons of the Diamond Drill & Machine Co., and to express the hope that the change of name will mean as pleasant if not more pleasant dealings as with the old name. The New York office is at 52 Broadway.

Albany Grease.

Many varied experiences showing the great merit of Albany grease as an all around lubricant are constantly brought to the attention of Messrs. Adam Cook's Sons, 313 West Street, N. Y. City, the sole manufacturers.

The following extract from a letter recently received by them from L. P. Harvey, Clare, Ill., relative to tests of "Albany" made by himself as well as by a customer will be noted with interest by engineers generally:—

"I put the cup on the wrist pin of an engine that had always given a great deal of trouble, and from the very first use of the grease the pin ran cool, and has done so ever since although it is badly overloaded. My customer got a supply of the 'Albany' of a firm in Chicago and has used it on all of his machinery where possible ever since, and I am very certain he will make a permanent customer. One thing he told me was, he had always been prejudiced against the grease on account of it costing him considerable more per pound than other kinds, but he had found out that it took so much less that it really was the cheapest, and moreover his bearings ran cool."

The Albany Steam Trap.

The following letter was recently received by the Albany Steam Trap Co., Albany, N. Y.:

Poughkeepsie, N. Y., March 2, 1905.

Messrs. Townsend & Blessing, Albany Steam Trap Co., Albany, N. Y.

For your information:—

Would state that I installed one of your traps in the N. Y. C. Round House, at Poughkeepsie, on February 2, 1905. or in other words I got new fittings for this trap as old fitting was worn out. After getting new fitting on February 2, 1905, trap was started and in checking up the coal used in January, 1905, as against the amount used for 25 days in February I find that we have saved over 66 tons of coal in 25 days, and over 125,000 gallons of water. I think this is a good saving for 25 days.

Yours respectfully,

E. Van Keuren, Foreman.

The trap in question was purchased from the Albany Steam Trap Co. by the railroad company and installed at Poughkeepsie in 1878, twenty-seven years ago. It worked continuously until within a period of two or three years ago when some of the parts became worn, and as Mr. Van Keuren explains in his letter, were not renewed until February, 1905. The cost of the repairs was $16.50.

The trap is called upon to return the water of condensation from the heating system of the repair shop, large round house and passenger station, the latter a building with a large dining room, back to the boiler. The steam and condensed water travel from the boiler through a circuit of 885 feet to the trap and thence to the source in the boiler.

The average monthly consumption of coal at the Poughkeepsie plant is 296 tons. It is perhaps well to explain here that the system is in operation twenty-four hours per day, under a boiler pressure of from 80 to 90 pounds. The company paid for the trap when new the sum of $120 and for the recent repairs, as stated, $16.50.

The saving of 66 tons of coal and 125,000 gallons of water in twenty-five days is certainly a good showing for the last expenditure of $16.50. The saving made on water alone would almost pay for the repairs.

Mr. Van Keuren in arriving at his results left nothing to chance. He says in his letter, "in checking up the coal used in January, 1905, as against the amount used for 25 days in February, I find that we have saved 66 tons of coal in twenty-five days." In comparing the average temperatures for this locality, it was found that during January the average temperature was 21 degrees and during February, 18 degrees, or 3 degrees colder than January. It is reasonable, therefore, to expect that in order to obtain the same amount of heat in the service, the coal consumption for February ought to show a marked increase over that for the same period in January. That a very appreciable saving was made is a fact that speaks well for the efficiency of the trap.

Tapes and Bindings.

Hoffman, DeWitt & McDonough, Cottman and G Sts., Ryer's Station, Fox Chase, a suburb of Philadelphia, report that they are very busy turning out their line of tapes, webbings and bindings, which are meeting with such great success among the trade.

H. S. Vila Opens Boston Office.

H. S. Vila, prominently known throughout the textile trade as an importer and dealer in aniline colors, dyestuffs and extracts, whose main office and warehouse is at 115 South Second St., Philadelphia, Pa., desires to announce to the trade that he has opened an Eastern office at 70 Kilby St., Boston, Mass., with William H. White in charge as his New England representative.

Prizes for the Solution of Technical Problems.

The Council of the Society of Dyers and Colorists have pleasure in announcing that funds have been placed at their disposal for distribution in the form of prizes for the solution of technical problems. It is hoped that the prizes now offered for competition will form the nucleus of a comprehensive prize scheme which will prove of value to the progress of the dyeing and allied industries, and will stimulate research. The Council request the assistance and co-operation of members and others in developing this scheme, and will be glad to receive additional offers of prizes and problems.

1. Prize of $100 for a satisfactory systematic tabulation of the reactions of dyestuffs on the fibre, and a comprehensive scheme for their identification on dyed fabrics.

The scheme should include the principal coloring matters dyed singly on all fibres for which they are employed. Competitors may adopt any method of classification they think desirable, but it is suggested that one or two reagents only be used as group tests, other reagents being subsequently applied for distinguishing the individual colors in a particular group.

2. Prize of $50 for a reliable method of distinguishing between unmercerized and mercerized cotton of various qualities, and for the estimation of the degree of mercerization without reference to lustre.

3. Prize of $100 for a full investigation of the causes of the tendering of cotton dyed with sulphide blacks, and the best means of preventing such tendering.

4. Prize of $100 for a satisfactory standardization of the strength and elasticity of cotton yarns of various qualities and twists in the grey and bleached conditions.

5. Prize of $100 for a full investigation of the average degree of tendering brought about in cotton yarn of various qualities by—

(a) Cross dyeing with acid colors;
(b) Dyeing Aniline Black; and
(c) Various other dyeing processes,

with the object of fixing standards for the trade.

The prizes are open to all, irrespective of nationality.

Papers will be accepted in English, French or German.

All papers, patterns, drawings, etc., sent in must be marked with a motto, and with the number of the problem, and must be delivered free to the Honorary Secretary of the Society before December 31st, 1905, accompanied by a sealed envelope bearing the same motto and containing the name and address of the competitor. The Committee of Adjudication has the right of opening the envelopes if it is found necessary to obtain further information from the competitor.

This rule will not apply where the working of machines or processes has to be demonstrated practically by the competitor. In these cases the competitor is not obliged to maintain anonymity when submitting his work. When necessary the Committee of Adjudication will examine on the spot any particular machine or process connected with the competition.

Every competitor has the right to take out a patent for his process or invention, but the Society reserves to itself the right of publication, either wholly or in part, of the work submitted.

The Honorable Secretary of the Society will be glad to communicate with anyone desiring to include further problems in the above list.

Ernest T. Holdsworth, Hon. Sec.,
Westholme, Great Horton, Bradford, England.

Hemolin Patents Sustained.

The United States Circuit Court of Appeals on April 19th handed down a decision affirming the opinion of the Circuit Court in the suit of Hemolin Company against the Harway Dyewood and Extract Manufacturing Co. for infringement of the Hemolin patents. The decision of the lower Court was in favor of Hemolin Company and the defendants appealed with the result that the appellate court has sustained the decision and affirmed the validity of the patents. It is understood that several other suits which have been deferred awaiting this decision will now be pushed by the Hemolin Company.

Takes Western Agency.

E. G. Harper will, after May 1st, represent Messrs. F. A. Straus & Co., exclusively in the West. Mr. Harper is thoroughly familiar with the yarn trade. He will make his headquarters in Chicago.

Textile Soaps.

E. A. Graham, secretary of the American Soap and Washoline Co., Cohoes, N. Y., was an attendant at the meeting of the New England Cotton Manufacturers' Association in Boston in April. New England mills are large customers of this company, which makes a full line of textile soaps, washing powders and other products of this kind that are so largely used by textile manufacturers.

A Summer Outing.

Asbury Park and Ocean Grove, the twin seaside cities of New Jersey, are by far the most popular outing places on the coast. There is no objectionable feature to detract from their attractiveness and the abundance of genuine enjoyment which is to be found there is limited only by the tourists' ability to find it.

There are exceptional bathing facilities, broad walks at the ocean edge, picturesque drives in every direction. A social atmosphere, wholesome and enjoyable, and entertainment the like of which no other shore resort provides. The municipality provides daily concerts and at the mammoth casino there is a series of entertainment by the best talent in the land. The National Educational Association has chosen Asbury Park and Ocean Grove as the meeting place for 1905, and from appearances it will be the most interesting convention ever held by the Association. The New Jersey Central is the popular line between New York and Asbury Park having both an all rail and boat line to the resort. If you are interested in the seashore cities drop a postal to C. M. Burt, G. P. A., New Jersey Central, New York City, for Educational Folder No. 1, it's free for the asking.

Change of Name.

The Diamond Drill & Machine Co., Birdsboro, Pa., has changed its name to the Birdsboro Steel Foundry & Machine Co.

Preparatory Machinery.

William Schofield Co., the well known iron founders and builders of textile machinery on Krams Ave., Manayunk, Philadelphia, Pa., are at the present time enjoying a season of great prosperity. The company are building large numbers of their rag, wool, hair and finishing pickers, automatic, square and cone willows, intermediate feeds for cards, rag and extract dusters, waste pullers, worsted and shoddy reels and all kinds of spike and slat aprons, so well known and largely used by the textile manufacturers in this country. They are also well known for the class of work they do in the way of building special machinery. They make a specialty of repairing and relagging picker cylinders.

The Jones Boiler Stoker.

An installation of forty Manning boilers at The Amoskeag Mfg. Co., Manchester, N. H., has been equipped with the Jones stoker.

The boiler house and its entire equipment were designed by Captain Manning and when completed it will have the finest appointments in every detail of any plant in the New England States, no expense having been spared to make it up-to-date in every particular. The installation of the 40 stokers now under way is, in reality, a second order. Captain Manning having thoroughly demonstrated the merits of the Under Feed Stoker Co.'s apparatus by an installation of 1,800 H. P. in the Amoskeag Mills and which has been in operation about two years.

The Jones stoker is also in use in the boiler plant of the Saco & Pettee Machine Shops at Biddeford, Me.

The Saco & Pettee Co. are among the largest manufacturers of textile machinery in the United States, their product being used universally throughout the New England mills as well as in the many new textile mills in the South. Immediately across the river at Saco, Me., the York Mfg. Co. is located. This is another of the large Eastern textile mills and classed as manufacturers of cotton goods. Three times has the York Co. given repeat orders, seven stokers at each time, or a total of 21 for their plant. Installation under the latest contract has not as yet been completed.

Four of the Jones stokers are installed in the boiler room of the Gloucester Electric Co. at Gloucester, Mass., representing two orders. A view of the Lynn Gas and Electric Company's boiler room at Lynn, Mass., shows the same apparatus installed and equipped with the Cole Automatic attachment. This installation has just been completed and is in the nature of a second order. The company installed a single stoker about three years ago and when replacing some of the old style return tubular boilers in their plant with new B. & W. water tubes this order was given to the Under Feed Stoker Co., Marquette Bldg., Chicago, Ill., for equipment of the new units.

Australian Wool Exports to the United States.

In comparison with former years the exports of wool this season from Australia to the United States show a very large increase, the gain over last season being over 100 per cent. The number of bales shipped to the United States from the ports of Australia from the beginning of the season to date was as follows: Melbourne, 50,074; Sydney, 19,555; Brisbane, 188; Adelaide, 161; total, 69,978 bales, valued at nearly $6,000,000. It is anticipated that by the end of the season 75,000 bales will have been shipped to the United States.—John P. Bray, Consul-General, Melbourne.

Bleaching and Dyeing.

Samuel Rowland, of Schuylkill Haven, Pa., bleacher and dyer of knit underwear in the roll, and cotton yarns on cones, with a capacity of 10,000 pounds per day, reports that the month of March favored him with the largest amount of business since his mill has been in operation. There is a fair promise that the succeeding months will be as large if not larger. The plant is now being worked to its full capacity in order to get out the rush of orders on hand. Mr. Rowland also does a large business in selling bleached and dyed yarns.

Calico Printing Before the Fifties.

Mr. John Stirling contributed to the proceedings of the Manchester Society of Dyers and Colorists last week an interesting paper dealing with the development of color printing and dyeing. He described how the printers at that time built a plank bridge across the brook and hung their cloths in the stream when they were to be washed. At that time block printing was to the front, and the men worked on long tables often with heavy blocks, the colors being spread on cloth sieves by boys who rejoiced in the name of tearers. The modern methods of drying and steaming were not then in vogue, although a steamer was introduced about 1850, when the use of albumen for fixing pigment colors came into vogue; previously ultramarine and other colors of this time were fixed with indiarubber solution.

The color mixers had many little secrets of their own in mixing the colors, and jealously guarded them. Though the men were not paid high wages (in some cases $3.00 per week), they took great interest in their work, and if there was a special bit to finish, they were not above putting a little overtime in, not as modern workmen are—ready and waiting for the bell to ring so that they can scatter home. Then men worked not so much from the love of making money as from the desire to produce something of distinctly artistic merit. At the present day, however, individual effort is discouraged, while the artistic side is not observed as it was in the early days of color printing. Considering the great mechanical and chemical difficulties under which the printers of that time worked, it is surprising to note the beautiful designs they could, and did, turn out, twelve colors being not at all uncommon.—Textile Mercury.

The Arabol Manufacturing Co.

To give elasticity and tensile strength, to strengthen the starch both in volume and adhesive power, Arabol Gloy G is highly recommended. In its pure state Gloy G is well adapted for either light or heavy sizing of cotton warps and especially recommended for use on export goods, such as China shirtings, drills, denims, coarse or medium goods, etc.

It is one of the staple products of the Arabol Mfg. Co., 100 William Street, New York.

Columbian Rope Co. Opens a New York Office

The Columbian Rope Co., whose works and main office are at Auburn, N. Y., has recently opened a New York office in the new Taber Building, 78-80 Wall Street, corner of Pearl, in charge of Charles M. Albertson. Mr. Albertson is familiar with the requirements of the New York trade, having been a salesman for the American Mfg. Co. for two years and for the New York Cordage Co. for one year, severing his connection with the last named concern on January 1st.

The Columbian Rope Company, in opening this office is pursuing the policy of expansion, which it has followed ever since its organization. During the last two years it has established a number of agencies throughout the South and West. Within a year it has installed a soft fibre plant, and is now making jute and American hemp twines of various kinds, the superintendent of this department having had a number of years' experience in manufacturing hemp twine where Kentucky hemp is raised.

The company has also recently increased its capital stock from $600,000 to $1,000,000. There are now 10,000 shares of a par value of $100 each. The new stock, 4,000 shares, is preferred stock, entitled to 6 per cent. cumulative dividends. Edwin D. Metcalf is president and George Underwood secretary of the company.

A City of Pleasure.

A most extraordinary place is Atlantic City. Known far and wide and the Queen Resort of the Atlantic Coast. World wide famous as a summer resort and renowned likewise as the most attractive place for a spring vacation. The Board Walk skirts the ocean front for 5 miles and offers an unobstructed view of the briny deep. Easter time is the gala season at Atlantic City and the town is thronged then with a select people from every section of the country. No place in the world has a greater number or more sumptuous hotels than Atlantic City and every comfort possible is placed at the disposal of the guest.

Atlantic City is the mecca to which Northerners hie themselves for the spring vacation and the most widely known and popular route from New York to Atlantic City is the Central Railroad of New Jersey. There is double daily service between New York and Atlantic City via this line and the running time is but 3 hours. Trains are vestibuled and the Pullmans are Buffet equipped. If you want a folder send this notice with your address to C. M. Burt, G. P. A., New Jersey Central, Central Bldg., New York City.

The Belgian Linen Trade.

For a long period Belgium has maintained a very important trade in linen goods, its products being sent all over the world. The flax plant grows in the country, and that produced around Courtrai has a well-deserved reputation as among the best in the world, ranking next, if not quite equal, to the best Irish-grown flax. As a matter of fact Courtrai and Belfast have for centuries been strong competing centres of the flax trade, notwithstanding which there has been a sort of mutual dependence between them—for Belfast flax-workers can be found in Courtrai and Courtrai linen hands in Belfast. An Englishman visiting Courtrai (which is not by any means one of the Belgian tourist resorts, although not without a certain picturesqueness) cannot fail to be struck with the extent to which English is spoken there. Of recent years Courtrai has somewhat lost its importance as the chief linen town, the trade having migrated to its larger and more important neighbor, Ghent, which (being in direct sea communication with Holland, England, and other countries) is better situated for carrying on international trade. Besides the locally-grown flax, large quantities are imported into Belgium from Holland, Russia, France, and other countries.

The spinning is carried on at Ghent and Courtrai principally; but at Liege, Malines, Tournai, Roulers, and Lokeren some 280,000 spindles are also engaged and 14,000 persons employed. All varieties of flax yarn are produced, from 8's to 110's, and altogether it is estimated that 66,000,000 lbs. are spun. Sixty per cent. of this is sent to England, and smaller quantities to Germany, Holland, Italy, France, Spain, and Switzerland. Notwithstanding its large production of flax yarns, Belgium imports a great deal of the finer grades from Ireland, the climate of which country is more suitable for spinning fine yarns than is that of Belgium. Belgian flax-spinners aim at quality, and it is by this course they have been able to develop their large export trade.

The linen-weaving trade used to be largely centred at Courtrai, and at the commencement of the last century some 3,000 looms were engaged. It is, however, now more widely distributed and carried on at Ghent, Alost, Roulers, Turnhout, and Ruyshroek. The finest linen fabrics are produced at Ghent and Courtrai and neighboring towns; damask linen at Ruysbroek and Ghent; heavier fabrics at Turnhout, Ghent, and Courtrai; and linen velvets at Avelghem. It is estimated that 17,600 persons are engaged in the trade, both power-looms and hand-looms being worked.

The workers in the trade are paid after various systems. Some are paid at so much per hour, and these form by far the larger proportion. As a rule the men earn $3.10 per week, while the women get $2.28. Some of the men are paid piece-work wages, and earn an average of $4.00 per week. A large proportion of the women are also on piece-work, and average $2.60 weekly. These wages, which are for adult workers, cannot be considered high, and do not compare with those paid in English mills. Younger persons get lower wages; those about 19 years of age may get $1.00 or $1.20 per week, and when a few years older they may get $2.00 or $2.40 per week. The normal working hours are 66 per week (11 hours per day), and there is no Saturday half-holiday.—Textile Mercury.

Bohemian Lace and Trimmings.

About 30 miles from Carlsbad, but reached only after a railway journey of four hours on account of its elevated situation in the mountains, is a town of about 10,000 inhabitants which has since 1870 been known throughout Europe as a place where excellent trimmings are made. This place, Weipert, is little known in the dry goods trade of the United States, and as I think it may be useful to some merchants in this line of business I have obtained the following information in regard to it from an interview with one of the manufacturers:

There are about 20 manufacturing concerns at Weipert in which trimmings of all kinds are made, but mostly what are called Kloppel (bobbin) articles, galloons, braids, laces, loops, drops, yard goods, machine goods, etc. There are about 10,000 workmen living in the district of Weipert, and the trimmings made there have a first-class reputation in Austria. As the wages are very low in the Bohemian mountains the prices of goods are likewise low.

During the past few months two firms of Weipert have had invoices certified at the Carlsbad consular offices, and this proves that Weipert goods are now being sent to the United States.

JNO. STEEL TWELLS,
United States Commercial Agent.
Carlsbad, Austria, February 17, 1905.

An Anticipated Pleasure.

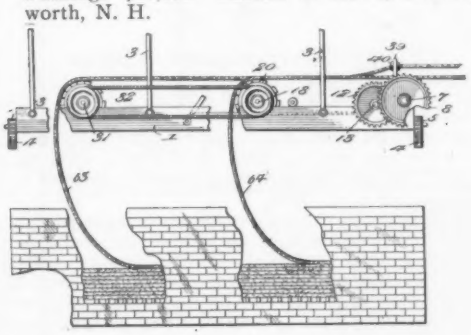
It is surprising to find so great an afflux to the seashore, especially to Atlantic City, during the Spring months, and this Spring the famed resort has been more popular than ever. The delightful weather, together with the uncommon surroundings, no doubt cause the increased favor with the Spring vacationist and after one short stay at Atlantic City there is a growing desire to prolong one's stay. The great hotels are marvels in their completeness of detail and the surroundings are those of gaiety and pleasure. The great board walk is ever thronged as the strand of a metropolis and the sources of amusement are unending. Particularly at Easter time is Atlantic City a favorite place and the elite of the nation are gathered there to enjoy the week's end. Fashion, wealth and society prevail, and one interested in the doings of the great resort find unalloyed pleasure. The New Jersey Central operates the short line to Atlantic City, the time occupied in the journey being three hours. Trains leaving New York at 9.40 a. m., and 3.40 p. m. reach Atlantic City at reasonable hours and the Buffet Parlor car service operated by this line is superb. If you are in search of a good time Easter go to Atlantic City.

Minnesota, Kilkenny. It is reported that $50,000 has been subscribed toward a new woolen mill to be established here.

Recent Textile Patents.

BRAID MACHINE. 787,383. Charles Klein, Brooklyn, N. Y., assignor to The Castle Braid Co.

CLOTH IN VATS. Machine for Automatically Folding. 786,160. Samuel C. Rowe, Somersworth, N. H.



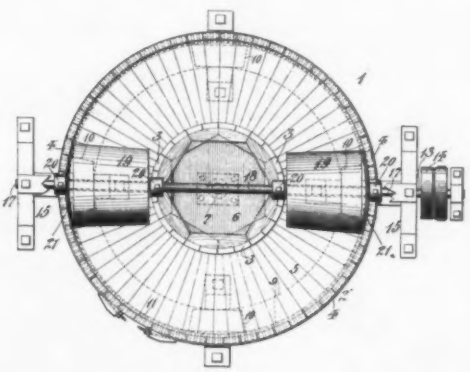
This invention relates to improvements in machines for automatically folding strips of cloth in vats or kiers. The object is to provide a machine or apparatus of the kind named which is simple in construction and efficient in operation.

COMBING MACHINE. 787,139. Alfred Wenning and Chas. H. Gegauff, Mulhouse, Germany, assignors to Societe Alsacienne des Constructions Mecaniques, Mulhouse, Germany.

COP TUBE. 786,698. Simon W. Wardwell, Providence, R. I., assignor to Universal Winding Co., Portland, Me.

COTTON PICKER. 787,314. John Summerfield, Dallas, Texas.

DYEING MACHINE. 786,162. Max Sarfert, Philadelphia, Pa.



This invention consists of an improved construction of a dyeing and saturating machine embodying a rotatable tub or trough, which is adapted to coact with rollers mounted upon a shaft and supported so as to be capable of upward movement, if desired, said trough being supported upon suitable antifriction devices and rotated in any convenient manner.

DYEING MACHINE. Skein. 787,285. William E. Fletcher, Paterson, N. J.

FIBRES. LIBERATING and Separating. 786,721. Henry S. Blackmore, Mount Vernon, N. Y.

LOOM. DAMASK JACQUARD. 786,389. Fritz A. Sterner, Abo, Russia.

LOOM FOR MAKING Pile Fabrics. 786,734. Joseph T. Cyr, Worcester, Mass., assignor to Crompton and Knowles Loom Works.

LOOM. NARROW WARE. 786,237. Otto W. Schaum, Philadelphia, Pa.

LOOM PROTECTING Mechanism Controller. 787,114. Joshua Robinson, Lawrence, Mass.

LOOM SHEDDING MOTION. 787,026. Paul Dietz, Philadelphia, Pa.

LOOM SHUTTLE. 785,925. Alfred Whitehead, Fall River, Mass.

LOOM SHUTTLE MOTION. 785,958. William F. Kintzing, New Freedom, Pa.

LOOMS. SHUTTLE Positioning Means for Filling Replenishing. 787,469. Charles F. Roper, Hopedale, Mass., assignor to Draper Co., Hopedale, Mass.

LOOM SHUTTLE Box Motion. 787,448. George F. Hutchins, Worcester, Mass., assignor to Crompton & Knowles Loom Works, Worcester, Mass.

LOOM SHUTTLE LOCKING Means. 787,832. Henry Cote, West Warren, Mass., assignor to Draper Co., Hopedale, Mass.

LOOM TAKE UP Mechanism. 787,281. Randolph Crompton and John Fitton, Worcester, Mass.

LOOM WEFT REPLENISHING Mechanism. 786,240. Otto W. Schaum, Philadelphia, Pa.

LOOM WEFT REPLENISHING Mechanism. 787,634. George A. Parker and William A. Twiss, New Bedford, Mass.

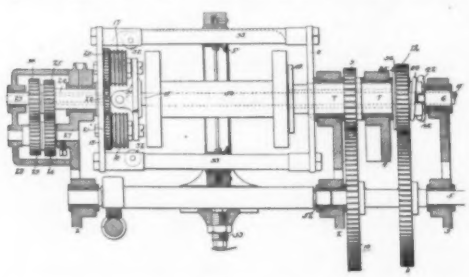
LOOM WEFT REPLENISHING Mechanism. 787,497. Oscar Cosserat, Amiens, France.

MERCERIZING MACHINE. 786,264. Harry W. Butterworth, Philadelphia, Pa.

SHUTTLE BOX ACTUATING Mechanism. 786,232. Anthony J. O'Reilly, Worcester, Mass., assignor to Crompton-Thayer Loom Co., Worcester, Mass.

SPINNING, TWISTING and Winding Machine. 786,198. Robert Dawes, Philadelphia, Pa.

This invention consists of certain improvements in spinning, twisting, or winding machines, the ob-



ject being to simplify and cheapen the construction of the frictional driving device which governs the rotation of the winding spool or bobbin as well as to increase the effectiveness of said driving device.

SPINNING COP TUBE. 786,528. Harry Spence, Sanford, Me.

SPINNING FRAME THREAD Guide. 786,380. Clarence A. Pierce, Manchester, N. H.

SPINNING RING FRAME. 787,087. Oliver Dumas, Fall River, Mass.

SPINNING SPINDLE. 785,738. Harold Kelly, Biddeford, Me., assignor to Sawyer Spindle Co.

SPOOL STAND. 786,572. Horace E. Leeman, Lynn, Mass.

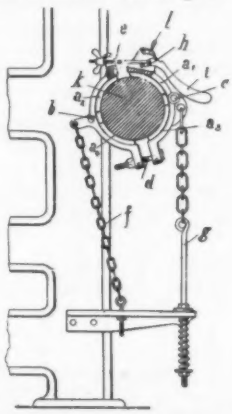
TWISTING MACHINE. Warp. 787,511. Gustave Hiller, Zittau, Germany.

TWISTING OR SPINNING Machine. 787,554. Herbert G. Beede, Pawtucket, R. I.

TWISTING OR SPINNING Machine Knotting Attachment. 787,426. Herbert G. Beede, Pawtucket, R. I.

WARP BEAMS, BRAKE FOR. 787,323. Carl Ernst Buschmann, Glauchau, Germany.

The object of this invention is a brake for warp-beams for use in looms for the purpose of effecting a smooth and uniform working of the brake. It



can easily be applied to warp-beams of different diameters and can be used in different systems of looms, because its construction will admit an easy application or removal.

As shown in the accompanying drawing, it consists of a ring-band composed of four parts a′ a² a³ a⁴, which are mounted with felt or other suitable material and are connected two by two through joints b and c, which can be tightened or loosened by means of adjusting-screws d and e. The brake-ring cannot participate in the revolution of the warp-beam k, being prevented from doing so by means of chains f and g, the latter of which stands under the action of a spring. The adjusting-screw e is arranged upon a lever i, which is pivoted at h and secured upon the part a′, so as to enable a convenient loosening of the brake merely by lifting the latch l from its engagement with the lever and to slacken the latter, which for this purpose is provided with several rests.

WINDER. BOBBIN. 785,812. Roland H. Legg. Carthage, Mo.

C. E. RILEY & CO.

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BUILDERS AND IMPORTERS OF

COTTON WOOLEN WORSTED

MACHINERY

DIRECT .. .. IMPORTERS OF **EGYPTIAN COTTON**

Thomas Broadbent & Sons,

Huddersfield, Eng.

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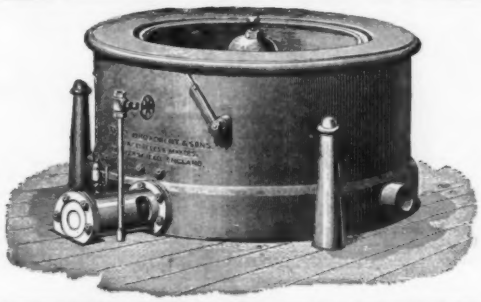
HYDRO-EXTRACTORS

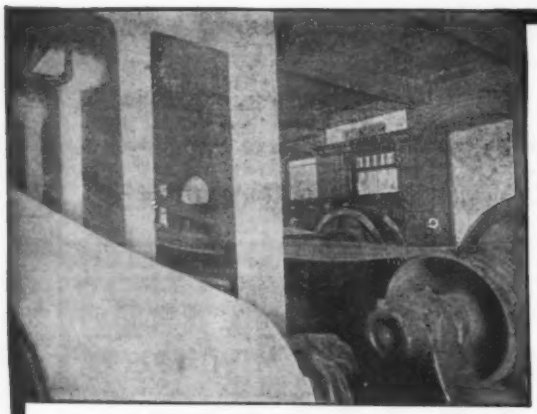
OVER 3500 IN USE. ALSO ELECTRICALLY DRIVEN



SUSPENDED ON LINKS. REQUIRING NO EXPENSIVE FOUNDATIONS

C. E. RILEY & CO., Sole Agents 65 Franklin St., Boston, Mass.

Machines Kept in Stock in Boston



JAMESTOWN, N. Y., Oct. 27, 1904.

CLING-SURFACE CO., Buffalo, N. Y.

GENTLEMEN:—The data herewith explains the conditions of the belts you have photographs of.

Our engine is 1000 H. P. The belts run from two 20 ft. pulleys (62 R. P. M.) to two 31" pulleys (450 R. P. M.) The large belt is 40" face, double leather, on 45 ft. centers. The shorter belt is 40" face, also double leather and on 35 ft. centers. The two belts were doing 500 H. P. when photographed and could do much more.

I have used Cling Surface here for five years and am entirely satisfied with it. These belts are clean, not sticky, pliable and in fine condition and the larger is running with a sag of 4 ft., while the smaller is 22" slack. I believe in slack belts and Cling-Surface permits me to run them so.

Yours very truly,
W. H. COBB, Chief Engr.,
Broadhead Worsted Mills.

Five Years Use in the Broadhead Mills

These big belts are a good example of what Cling-Surface is doing. Don't think of Cling-Surface merely as a material for belts. It is that, but its far reaching results make it a means to a new method of belt management—the easy or slack method, and that means low friction load, economy of oil, babbit, belts, fuel, power, time and trouble.

Get a package therefore and test it—severely.

CLING-SURFACE CO 199-205 Virginia St Buffalo N Y

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39 Cortlandt Street

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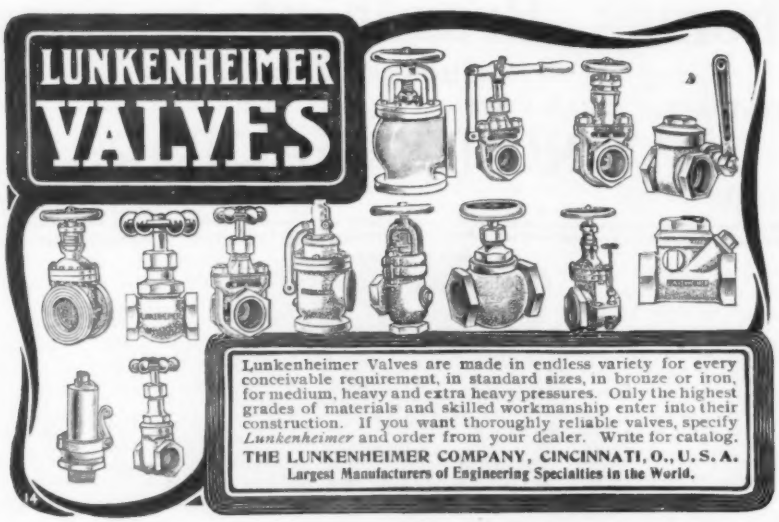
VALVES



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Largest Manufacturers of Engineering Specialties in the World.

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The addresses of builders of mill machinery and dealers in mill supplies, whose names appear in the following classified index, may be found upon referring to their advertisement. The Alphabetical Index to advertisers follows this classified list. Buyers who are unable to find in these classified lists such machinery or supplies as they desire, are invited to communicate with the publishers, who can, in all probability, refer them to proper sources.

Advertisers whose names do not appear under desired headings will please notify the publishers. Such omissions are accidental, not intentional.

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American Moistening Co.
Bell Pure Air & Cooling Co.
Schutte & Koerting Co.

Architects and Mill Engineers.
Ballinger & Perrott.
Dean & Main.
Ferguson, John W.
Suck, Adolph.

Automatic Feeds for Cotton and Wool.
American Drying Machinery Co.
Harwood, Geo. S. & Son.
Kitson Machine Co.
Leigh, Evan A.
Philadelphia Drying Machinery Co.
Philadelphia Textile Machinery Co.
Schofield, Wm. Co.
Woonsocket Machine & Press Co.

Bailing Machine.
North Chemsford Machine Co.
Torrance Mfg. Co.

Bandings.
—See under Yarns.

Baskets.
Lane, W. T. & Bro.
Morris & Co.

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Jeffrey Manufacturing Co.
Main Belting Co.
Shultz Belting Co.
Turner, J. S., Mfg. Co.
—See also Mill Supplies.

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Cling Surface Mfg. Co.
Dixon, Jas., Crucible Co.
Shultz Belting Co.
Stephenson Mfg. Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Machine Co.

Bindings.
—See Tapes and Braids.

Bleaching Kiers.
Allen, William Sons Co.
Arlington Mch. Wks. (Arthur Birch, prop.)
Textile Finishing Machinery Co.

Bleaching Materials.
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Boston Blower Co.
Buffalo Forge Co.
Green Fuel Economizer Co.
Mass. Fan Co.
New York Blower Co.
Philadelphia Drying Machinery Co.
Schutte & Koerting Co.
Sturtevant, B. F., Co.
Schnitzler, Chas. H.

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Leigh, Evan A.
Tebbets, E. L. & Co.

Boiler Arches, "Steel Mixture."
McLeod & Henry.

Boiler Setting.
McLeod & Henry.

Boilers.
—See Steam Boilers.

Boxes, Cloth Boards, Etc.
Pearson, J. T.

Boxes (Paper).
—See Paper Boxes.

Braiding Machinery.
New England Butt Co.
Textile Machine Works.

Braids.
—See Tapes, Braids and Edgings.

Brass (Perforated).
—See under Perforated Metal.

Brushers.
—See Napping Machines.

Brushes.
Felton, S. A. & Son Co.
Mason Brush Works.

Burr Pickers.
Curtis & Marble Machine Co.
Sargent's, C. G., Sons.

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Stoddard, Haserick, Richards & Co.

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Davenport Pearl Button Co.
International Button Co.

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Butterworth, H. W. & Sons Co.
Taunton, New Bedford, Copper Co.
Textile Finishing Mchry. Co.
—See also Dyeing, Bleaching, Mangery, etc.

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Lane, W. T. & Bro.
Morris & Co.

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Riverdale Woolen Co.

Carbonizing Machinery.
American Drying Machinery Co.
Philadelphia Drying Machinery Co.
Philadelphia Textile Machinery Co.
Sargent's, C. G., Sons.

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Ashworth Bros.
Bowes, L. M., Co.
Leigh, Evan A.
Riley, C. E. & Co.
Stoddard, Haserick, Richards & Co.
Sykes, Jos. & Sons.

Card Feeds.
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Card Grinding Machinery.
Entwistle, T. C., Co.
Leigh, Evan A.
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Riley, C. E. & Co.
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Altemus, Jacob K.
Curtis & Marble Machine Co.
Philadelphia Textile Machinery Co.

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Link Belt Engineering Co.
Lunkenheimer Co.
Schofield, Wm., Co.

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Yale & Towne Mfg. Co.

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Weeks, A. J.

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Roessler & Hasslacher Chemical Co.
Solvay Process Co.

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Little & Walker.

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Cling Surface Mfg. Co.

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Smyth, J. L. N. Paper Co.

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Textile Finishing Machinery Co.

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American Tool & Machine Co.
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Hunter, James, Machine Co.
Klein, Chas. C.
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Reeves Pulley Co.

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Comb Aprons.
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Combs (Wool and Cotton).
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Condensers.
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Conveyors, Pneumatic.
—See Blowers & Blower Systems.

Conveying Machinery and Chains.
Coburn Trolley Track Co.
Jeffrey Manufacturing Co.
Link Belt Engineering Co.

Cop Tubes.
—See Paper Tubes.

Copper (Perforated).
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Copper Print Rollers.
Rome Metal Co.
Taunton, New Bedford, Copper Co.

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Badger, E. B. & Sons Co.

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Butterworth, H. W. & Sons Co.
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Stoddard, Haserick, Richards Co.

Cotton Elevators.
Buffalo Forge Co.

Cotton Machinery.
Altemus, Jacob K.
American Textile Appliances Co.
Atherton, A. T., Machine Co.
American Drying Machinery Co.
Ashworth Bros.
Baker Machine Co.
Barber & Coleman Co.
Barker, James.
Butterworth, H. W. & Sons Co.
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Crompton-Thayer Loom Co.
Cohoes Foundry & Machine Co.
Coldwell-Gildard Co.
Curtis & Marble Machine Co.
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Elliott & Hall.
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Firth, William, Co.
Howard & Bullough American Mach. Co.
Kilburn, Lincoln & Co.
Kitson Machine Co.

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North Chelmsford Machine Co.
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Philadelphia Textile Machinery Co.
Providence Machine Co.
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Saco & Pettee Machine Shops.
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Vacuum Dyeing Machine Co.
Whitin Machine Works.
Woonsocket Machine & Press Co.

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Warren Soap Mfg. Co.

Cotton Waste.
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Greaves, Frank B.

Crayons.
Dixon, Jos., Crucible Co.
Lowell Crayon Co.

Cutter for Knit Goods.
Eastman Machine Co.
Langston, Samuel M.

Cutting Machinery.
Eastman Machine Co.

Dextrine.
Stein, Hirsh & Co.

Dobbies.
Crompton & Knowles Loom Works.
Crompton-Thayer Loom Co.
Stafford, G. W., Mfg. Co.

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Pearson, J. T.

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Dust Collectors.
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Cranston Worsted Mills (Yarns).
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Ingrahamville Dye Works.
Lorimer's, The Wm. H. & Sons Co.
Maryland Bleach & Dye Works.
Pawtucket Dyeing & Bleaching Co.
Providence Mills Mfg. Co.
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Dye Sticks.
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Haedrich, E. M.

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Metz, H. A. & Co.
Nicol, J. M. & J. S.
Roessler & Hasslacher Chemical Co.
Solvay Process Co.
Sykes, Walter F. & Co.
Thayer, Ed. M.
Vila, H. S.
West Indies Chemical Works, Ltd.

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Edgings.
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Sprague Electric Co.
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Buffalo Forge Co.
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—See Ventilating Apparatus.

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Green Fuel Economizer Co.
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Goulds Mfg. Co.
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Norwood Engineering Co.
Phila. Water Purification Co., The.
Scaife, W. B. & Sons.

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—See Dyeing, Drying, Bleaching and Finishing.

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McLeod & Henry Co.

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Borgner, Cyrus, Co.
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Riley, C. E. & Co.
Thurston, A. G. & Son.

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Hopkins Machine Works.
Leigh, Evan A.

Forges.
Buffalo Forge Co.
Sturtevant, B. F., Co.

Forwarders.
McKeon, John F.

Friction Clutches.
—See Clutches.

Friction Cones.
Evans, G. Frank.

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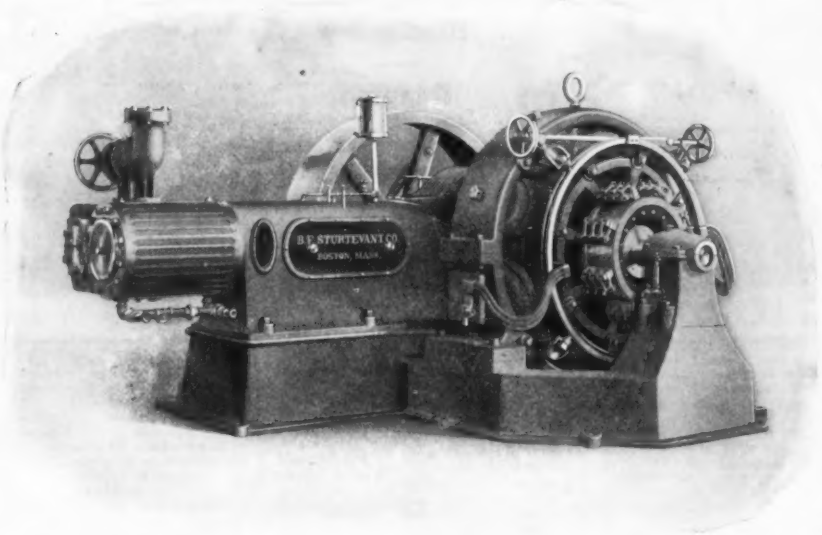
Built in the Sturtevant Shops to the Sturtevant Standard



Engine has forced lubrication giving highest mechanical efficiency. All running parts enclosed, yet readily accessible. Water shed partition. No throwing of oil.

Generator conservatively rated. Heavy overload capacity. Low temperature rise. Improved ventilation. Hard drawn copper segment. Bar wound armature.

In sizes from 3 to 250 K. W.

Send for Bulletin 63.

B. F. STURTEVANT CO.

BOSTON, MASS.

General Office and Works, Hyde Park, Mass.

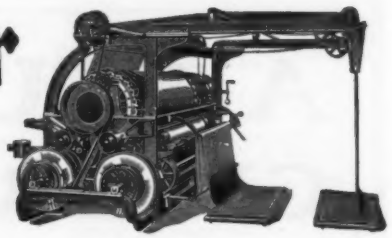
New York Philadelphia Chicago London

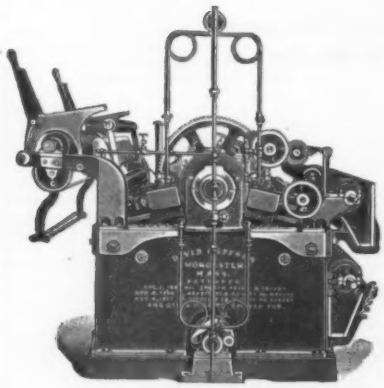
Designers and builders of Heating, Ventilating, Drying and Mechanical Draft Apparatus; Fans, Blowers and Exhausters; Steam Engines, Electric Motors and Generating Sets; Fuel Economizers; Forges, Exhaust Heads, Steam Traps, Etc,

428

David Gessner

Worcester, Mass.

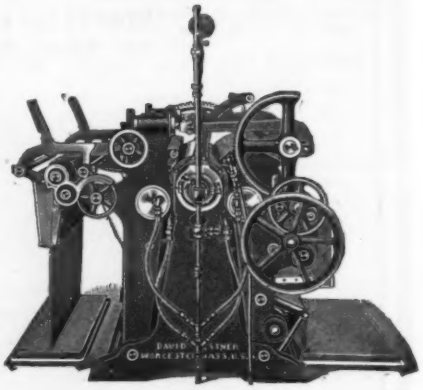




Latest Improved Cloth Finishing Machinery

—

Napping Machines and Presses a Specialty



Fuel Economizers.
Green Fuel Economizer Co.

Fulling Mills for Woolen Goods.
Hunt, Rodney, Machine Co.
Hopkins Machine Works.
Hunter, Jas., Machine Co.
Kenyon, D. R. & Son.

Garnetts.
Leigh, Evan A.
Philadelphia Textile Machinery Co.

Gas Engines.
Jones, Lewis.

Gas Exhausters.
Sturtevant, B. F., Co.

Gauges.
Crosby Steam Gage & Valve Co.
Lunkenheimer Co.
Walworth Manufacturing Co.

Gears.
Farrell Foundry and Machine Co.
New Process Raw Hide Co.

Gear Cutting.
Farrell Foundry and Machine Co.

Gear Cutting Machine.
Whiton, The D. E., Co.

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Buffalo Forge Co.
Sturtevant, B. F., Co.

Grate Bars.
Tupper, W. W. & Co.

Grease.
Cook's, Adam, Son.

Heating.
—See Ventilating.

Heddles.
Steel Heddle Mfg. Co.
Stoddard, Haserick, Richards & Co.

Hoisting Apparatus.
Coburn Trolley Track Co.
Yale & Towne Mfg. Co.

Hosiery Boards.
Pearson, J. T.

Hosiery Labels.
Beck, Charles Paper Co.
Kaumagraph Company.

Humidifying Apparatus.
American Air Moistening Co.
Bell Pure Air & Cooling Co.
Shutte & Koerting Co.

Hydro Extractors.
American Tool & Machine Co.
Broadbent, Thomas, & Sons.
Riley, C. E. & Co.
Rodney Hunt Machine Co.
Stoddard, Haserick, Richards & Co.
Textile Finishing Machinery Co.
Whiteley, William, & Sons, Ltd.
Whittle, Jas. H.

Injectors.
Lunkenheimer Co.
Schutte & Koerting Co.

Insulating and Braiding Silks.
Sauquoit Silk Mfg. Co.

Ironing Machines for Knit Goods.
Craw, J. W., Laundry Machinery Co.

Iron Work.
Link Belt Engineering Co.

Jacquards.
Halton's, Thomas, Sons.

Knit Goods, Edgings, Trimmings, Etc.
Cathcart, John & Co.
Chapin, Geo. W.
Charles, W. B.
Cheney Bros.
Friedberger Mfg. Co.
Hepner & Horwitz.
International Button Co.
Krout & Fite Mfg. Co.
Weimar Bros.

Knit Goods, Finishing Machines, Crochet, Etc.
Craw, J. W., Laundry Machinery Co.
Eastman Machine Co.
Langston, Samuel M.
Merrow Machine Co., The.
Nye & Tredick Co.
Rodney Hunt Machine Co.
Scott & Williams.
Union Special Machine Co.
Willcox & Gibbs Sewing Machine Co.

Knitting Machine Cylinders.
Branson Machine Co.
Paxton & O'Neill.
Stafford & Holt.

Knitting Machinery.
Boss Knitting Machine Co.
Branson Machine Co.
Brinton, H. & Co.
Claes & Flentje.
Cooper, Chas.
Crane Mfg. Co.
Excelsior Knitting Machine Mfg. Co.
Grosser Knitting Machine Co.
Hilscher, G.
Jenckes, E., Mfg. Co.
Jones, Lewis.
Koch, Edward W.
Lamb Knitting Mach. Mfg. Co.
Leighton Machine Co.
Mayo, Geo. D., Knitting Machine Co.
Mayo Knitting Machine & Needle Co.
McMichael, A.
National Automatic Knitter Co.
Nye & Tredick Co.
Paxton & O'Neill.
Ruth Machine Co.
Scott & Williams.
Stafford & Holt.
Standard Machine Co.
Taylor, James.
Tompkins Bros.
Walter & Co.
Walther, Otto.
Wildman Mfg. Co.

Knitting Needles and Supplies.
Branson Machine Co.
Breedon's, Wm., Son.
Brinton, H. & Co.
Cooper, Chas.
Corey, Wm., Co.
Crane Mfg. Co.
Dodge Needle Co.
Excelsior Needle Co.

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THE NEW
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Alexander & Garsed, Southern Agents.

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Grosser Knitting Machine Co.
Ives, Loyal T.
Kolb, Frank E.
Lamb Knitting Machine Mfg. Co.
Manufacturers' Supplies Co.
Mayo Knitting Machine & Needle Co.
Page Needle Co.
Treat, Orion.
Wardwell Needle Co.

Labeling Machines.
Beck, Chas., Paper Co., Ltd.

Lamps, Incandescent.
General Electric Co.
Sawyer-Mann Electric Co.
Westinghouse Electric & Mfg. Co.

Lathes.
McCabe, J. J.

Leather.
Bowes, L. M., Co.

Loom Pickers.
Garland Mfg. Co.

Looms.
Crompton & Knowles Loom Works.
Crompton-Thayer Loom Co.
Draper Company.
Kilburn, Lincoln & Co.
Leigh, Evan A.
Lowell Machine Shop.
Mason Machine Works.
Stafford, G. W., Mfg. Co.
Stoddard, Haserick, Richards & Co.
Whitin Machine Works.

Loopers.
Hepworth, John W. & Co.
Leighton Machine Co.

Lubricators.
Cook's, Adam, Son.
Borne, Scrymser Co.
Dixon, Jos., Crucible Co.
Lunkenheimer Co.

Lug Straps.
Bond, Chas.

Lumpers.
Gerry, George & Son.
Schofield, Wm., Co.

Machinery Dealers.
Jefferson, Ed. & Bro.
Lamb, J. K., Textile Mach. Co.
Schofield, Geo. L.
Stead, Arthur.
Taylor, James.

Machinists' Tools.
Curtis & Marble Machine Co.
McCabe, J. J.
Whitin, The D. E. Co.

Mails.
Walder, J.

Measuring and Folding Machines.
Elliott & Hall.
Fabric Measuring & Packaging Co.

Mechanical Draft.
American Blower Co.
Boston Blower Co.
Buffalo Forge Co.
Green Fuel Economizer Co.
Massachusetts Fan Co.
Sturtevant, B. F., Co.

Mechanical Engineers.
American Blower Co.
Buffalo Forge Co.
Dean & Main.
Murray Iron Works Co.
Philadelphia Drying Machinery Co.
Sturtevant, B. F., Co.
Suck, Adolph.

Mercerizers.
Greenwood & Bault, R.
Home Bleach & Dye Works.
Lorrimer, Wm. H., Sons Co.

Mercerizing Machinery.
Arlington Mch. Wks. (Arthur Birch, prop.)
Butterworth, H. W. & Sons.
Klauder-Weldon Dyeing Machine Co.
Smith, Drum & Co.
Textile Finishing Machinery Co.
Whiteley, William & Sons, Ltd.

Metallic Fire-proof Window Frames and Sashes.
Badger, E. B. & Sons Co.

Mill Architects.
—See Architects and Mill Engineers.

Mill Brushes.
—See Brushes.

Mill Builders and Engineers.
Ferguson, John W.

Mill Sewing Machines.
—See Sewing Machines and Supplies.

Mill Supplies.
American Supply Co.
Bamford & Smith.
Barker, James.
Bond, Chas.
Buckley's, Benj., Son, Gun Mill.
Crosby Steam Gage and Valve Co.
Easton-Burnham Co.
Eureka Fire Hose Co.
Garland Mfg. Co.
Jefferson, Ed. & Bro.
Jeffrey Manufacturing Co.
Lane, W. T. & Bro.
Leigh, Evan A.
Main Belting Co.
Morris & Co.
Murphy, E. W. & Co.
Philadelphia Drying Machinery Co.
Riley, C. E. & Co.
Richardson Bros.
Shaw, Victor, Ring Traveler Co.
Stephenson Mfg. Co.
Stoddard, Haserick, Richards & Co.
Thurston, A. G. & Son.
Tucker, W. W. & C. F.
Turner, J. S., Mfg. Co.
United States Supply Co.
Ward & Vandegrift.
Walworth Manufacturing Co.

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NOBODY WILL DISPUTE that rawhide is stronger than oak-tanned leather — that it will stand more strain and last longer because the long, unbroken fibres have not been separated by tanning.

SHULTZ "SABLE" RAWHIDE BELTING

has a kid-like surface which makes it cling to the pulleys. Underneath this are the long, unbroken, unseparated fibres of the rawhide—for strength. This, combined with its great pliability, enables us to guarantee "SABLE" belting to transmit a third more power, increase your production and outlast the best oak-tanned made to-day.

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Philadelphia, Land Title Building.
Pittsburg Farmers Bank Building.
Chicago, Old Colony Building.
Atlanta, Ga., Empire Building.
New Orleans, La., Hibernia Bank Bldg.

SALES OFFICES:
Cleveland, Barton Stevenson & Co.
Detroit, Miller, Seldon Elect. Co.
St. Louis, 320 Chemical Building.
Denver, Hendric & Bolthoff Mfg. & S. Co
Seattle & San Francisco } Kilbourne & Clark Co.

Motors.
—See Electric Motors.

Napping Machinery.
American Napping Machine Co.
Curtis & Marble Machine Co.
Gessner, David.
Jones, Lewis.
Leigh, Evan A.
Parks & Woolsen Machinery Co.
Whiteley, William & Sons, Ltd.

Noils (Silk).
Malcolm Mills Co.
Ryle, Wm. & Co.

Oil Cups.
Lunkenheimer Co.
Tucker, W. & C. F.
Walworth Manufacturing Co.

Oils.
Borne, Scrymser Co.
Cook's, Adam, Son.
Excelsior Wool Compound Co.
Murphy, E. W. & Co.
New York & New Jersey Lubricant Co.
Stephenson Mfg. Co.

Oil Hole Covers.
Tucker, W. W. & C. F.

Overhead Tracks.
Coburn Trolley Track Co.
Cohoes Foundry & Machine Co.

Overseaming Machines.
American Overedging & Seaming Machine Co.
Merrow Machine Co.
Willcox & Gibbs Sewing Machine Co.

Pantagraphs for Mill Engraving.
Johnson, C. A. & Co.

Paper.
Richardson Bros.
Smyth, J. L. N. Paper Co.

Paper Boards.
Shryock, J. K.
Smyth, J. L. N. Paper Co.

Paper Box Machinery.
Beck, Chas., Paper Co., Ltd.
Langston, Samuel M.

Patent Solicitors.
Crosby & Gregory.
Howson & Howson.

Perforated Metals.
Hopkins Machine Works.

Peroxide of Sodium.
Roessler & Hasslacher Chemical Co.

Pipes and Fittings.
Pancoast, Henry B. & Co.
Walworth Manufacturing Co.

Pneumatic Conveying.
—See Ventilating.

Power Transmission Machinery.
American Drying Machinery Co.
American Mfg. Co.
American Pulley Co.
Carlyle-Johnson Machine Co.
Cohoes Foundry & Machine Co.
Columbian Rope Co.
Evans, G. Frank.
Farrell Foundry and Machine Co.
Hunter, Jas., Machine Co.
Jeffrey Manufacturing Co.
Kilburn, Lincoln & Co.
Klein, Chas. C.
Link Belt Engineering Co.
Philadelphia Drying Machinery Co.
Reeves Pulley Co.
Rodney Hunt Machine Co.
Saginaw Manufacturing Co.
Schofield, Wm., Co.
Sellers, William & Co.
Standard Pressed Steel Co.
Textile Finishing Machinery Co.

Preparatory Machinery (Cotton).
Atherton, A. T., Mach. Co.
Howard & Bullough Am. Machine Co.
Kitson Machine Co.
Leigh, Evan A.
Riley, C. E. & Co.
Saco & Pettee Machine Shops.

Presses.
Boomer & Boschert Press Co.
Butterworth, H. W. & Sons Co.
Curtis & Marble Machine Co.
Gessner, David.
Hart, Charles.
Miller Press & Machine Co.
Murray Iron Works.
North Chelmsford Machine Co.
Spence & Rideout.
Textile Finishing Machinery Co.
Woonsocket Machine & Press Co.

Pressers and Flyers.
Baker Machine Co.

Pressure Regulators.
Crosby Steam Gage & Valve Co.
Mason Regulator Co.
Walworth Mfg. Co.

Pulleys.
—See Power Transmitting Machinery.

Pulley Covering.
Warren Company, The.

Pumps.
Goulds Mfg. Co.
Knowles Steam Pump Works.
Rodney Hunt Machine Co.
Textile Finishing Machinery Co.

Pump Governors.
Crosby Steam Gage & Valve Co.
Mason Regulator Co.
Walworth Mfg. Co.

Purifying & Filtration Plants.
Norwood Engineering Co.
Philadelphia Water Purification Co.
Scaife, W. B. & Sons.

Quillers.
Foster Machine Co.
North Chelmsford Machine Co.
Payne, G. W. & Co.

Rag Pickers.
Philadelphia Textile Machinery Co.
Schofield, Wm., Co.

Ramie Tops and Noils.
Tierney, Frank A.

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(Trade Mark Registered)

STANDARD FOR FOURTEEN YEARS.

The original weather-proof, elastic and acid-resisting roofing. Resists the great heat and the acid-fumes of dye-houses, etc. Highly fire-resisting. Contains no tar. Especially useful on saw-tooth roofs. Outlasts tin and iron. Send for samples and Booklet R.

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Garland Mfg. Co.
Walder, J.

Reels.
North Chelmsford Machine Co.

Reducing Valves.
Crosby Steam Gage & Valve Co.
Mason Regulator Co.
Walworth Mfg. Co.

Regulators (Pressure).
Crosby Steam Gage & Valve Co.
Mason Regulator Co.
Walworth Mfg. Co.

Remnants.
Feingold, H. & D.

Ribbons.
Barton, F. C.
Cheney Bros.

Ring Travelers.
DeHaven Mfg. Co.
Shaw, Victor, Ring Traveler Co.

Roofing.
Lincoln Waterproof Cloth Co.
Standard Paint Co.

Roller Coverers.
Turner, J. S., Mfg. Co.

Roller Leather.
Bowes, L. M., Co.
Turner, J. S., Mfg. Co.

Rope.
American Mfg. Co.
Columbian Rope Co.

Rope Transmission.
American Mfg. Co.
Columbian Rope Co.
Rodney Hunt Machine Co.

Roving Cans.
Hill, James, Mfg. Co.

Ruberoid Roofing.
Standard Paint Co.

Scallop Machines.
Merrow Machine Co.

Schools.
International Text Book Co.
Lowell Textile School.
New Bedford Textile School.
Philadelphia Textile School.

Secondhand Machinery.
——See Mchry. Dealers, also classified Ads.

Screens (Perforated).
——See under Perforated Metal.
——See Commission Merchants.

Separators.
Draper Co., The.

Sewing Machines and Supplies.
American Overedging & Seaming Mch. Co.
Arlington Mch. Wks. (Arthur Birch, prop.)
Curtis & Marble Machine Co.
Dinsmore Mfg. Co.
Fales, L. F.
Manufacturers' Supplies Co.
Textile Finishing Machinery Co.
Union Special Machine Co.
Walter & Co.
Willcox & Gibbs Sewing Machine Co.

Shafting, Hangers, Etc.
——See Power Transmission Machinery.

Shear Blades.
Heusch, Severin.

Shearing Machinery.
——See Dyeing, Drying, Bleaching and Finishing.

Sheet Metal Work.
Barney Ventilating Fan Works.

Shell Rolls.
Thurston, A. G. & Son.

Shoddies.
——See Wool Shoddies.

Shuttles.
——See Bobbins, Spools, Shuttles, Etc.

Silk Machinery.
Arlington Mch. Wks. (Arthur Birch, prop.)
Butterworth, H. W., Sons Co.
Leigh, Evan A.
Mason Machine Works.
Stoddard, Haserick, Richards & Co.
Textile Finishing Machinery Co.

Silk Mill Supplies.
Hall, I. A. & Co.

Silk Noils.
Fawcett, Hughes.

Singe Plates.
Arlington Mch. Wks. (Arthur Birch, prop.)
Butterworth, H. W., Sons Co.
Rome Metal Co.
Taunton, New Bedford Copper Co.
Textile Finishing Machinery Co.

Singeing Machines.
Arlington Mch. Wks. (Arthur Birch, prop.)
Butterworth, H. W., Sons Co.
Curtis & Marble Machine Co.
Knapp, Charles H.
Leigh, Evan A.
Smith, Drum & Co.
Textile Finishing Machinery Co.

Sizing, Starch and Gums.
Arabol Mfg. Co.
Nicol, J. M. & J. S.
O. K. Soap Co.
Stein, Hirsch & Co.

Skylights.
Bickelhaupt, G., Skylight Works.
Drouve, G., Co.
Lord & Burnham Co.

Slashers.
Cohoes Foundry & Machine Co.
Leigh, Evan A.
Lowell Machine Shop.
Riley, C. E. & Co.

Soaps.
American Soap & Washoline Co.
Dobbins Soap Mfg. Co.
India Alkali Works.
Nicetown Mfg. Co.
O. K. Soap Co.
Warren Soap Mfg. Co.

Spindles.
Bamford & Smith.
Buckley, Benjamin, Sons, Gun Mill.
Draper Company.
Easton-Burnham Co.
Hopkins Machine Works.
Leigh, Evan A.
Riley, C. E. & Co.
Stoddard, Haserick, Richards & Co.
Ward & Vandegrift.
Whitin Machine Works.

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Riley, C. E. & Co.
Stoddard, Haserick, Richards & Co.

Spinning Frames.
—See Cotton Machinery.

Spinning Rings.
Draper Company.
Whitinsville Spinning Ring Co.

Spinning Tubes.
Buckley, Benjamin, Sons.

Spools.
—See Bobbins, Spools, Shuttles, Etc.

Spoolers.
Draper Company.
Easton & Burnham Machine Co.
Lindsay, Hyde & Co.
Payne, George W. & Co.

Steam Boilers.
Allen, William, Sons Co.
Murray Iron Works Co.
Wickes Bros.

Steam Boiler Insurance.
Hartford Steam Boiler Inspection & Insurance Co.

Steam Boxes.
Allen, William, Sons Co.

Steam Engines.
American Blower Co.
Arlington Mch. Wks. (Arthur Birch, prop.)
Buffalo Forge Co.
Fishkill Landing Machine Co.
Harrisburg Foundry & Machine Co.
Hooven (The), Owens & Rentschler Co.
Murray Iron Works Co.
Sturtevant, B. F. & Co.
Textile Finishing Machinery Co.

Steam Jacket Kettles.
Badger, E. B. & Sons Co.

Steam Kettles.
Murray Iron Works.

Steam Pumps.
Goulds Manufacturing Co., The.

Steam Specialties.
Butterworth, H. W., Sons Co.
Crosby Steam Gage and Valve Co.
Lunkenheimer Co.
Mason Regulator Co.
Sturtevant, B. F., Co.
Textile Finishing Machinery Co.
Walworth Manufacturing Co.

Steam Traps.
Albany Steam Trap Co.

Stone Ware.
Weeks, A. J.

Stop Motion for Looms.
—See Warp Stop Motions.

Stop Motion for Knitting Machines.
Ruth Machine Co.

Tanks, Tubes and Vats.
Caldwell, W. E., Co.
Cypress Lumber Co.
Hall, Amos H., Son & Co.
Hopkins Machine Works.
Lewis, H. F. & Co.
North Chelmsford Machine Co.
Rodney Hunt Machine Co.
Stevens Tank & Tower Co.
Textile Finishing Machinery Co.
Woolford, George, Tank and Vat Mfg. Co.

Tapes, Braids and Edgings.
Barton, F. C.
Cathcart, John & Co.
Chapin, George W.
Friedberger Mfg. Co.
Krout & Fite Mfg. Co.
Weimar Bros.

Telephones.
Pettes & Randall Co.

Temples.
Draper Co.

Tentering Machines.
—See Dyeing, Bleaching Machinery, Etc.

Tenter Clips.
—See Dyeing, Drying, Bleaching and Finishing Machinery.

Textile Schools.
—See Schools.

Ticketing Machinery.
—See Labeling Machines.

Trade Mark Stamps.
Kaumagraph Co.
Metallic Transfer Co.

Trolley Tracks.
Coburn Trolley Track Co.

Trucking.
McKeon, John F.

Turbines.
—See Water Wheels.

Twine.
American Mfg. Co.
Richardson Bros.

Twisting Machinery.
Philadelphia Textile Machinery Co.
Whittle, Jas. H.

Valves.
Crosby Steam Gage & Valve Co.
Lunkenheimer Co.
Mason Regulator Co.
Schutte & Koerting Co.
Walworth Mfg. Co.

Ventilating Apparatus.
Allington & Curtis Mfg. Co.
American Air Moistening Co.
American Blower Co.
American Drying Machinery Co.
Barney Ventilating Fan Works.
Bell Pure Air & Cooling Co.
Berry, A. Hun.
Boston Blower Co.
Buffalo Forge Co.
Drouve, G. Co.
Lord & Burnham Co.
Massachusetts Fan Co.
New York Blower Co.
Nichols, E. M.
Philadelphia Drying Machinery Co.
Philadelphia Textile Machinery Co.
Sargent's, C. G., Sons.
Schnitzler, Chas. H.
Sturtevant, B. F., Co.

Warpers.
Draper Company.
Entwistle, T. C. Co.

Warping and Beaming Machinery.
Altemus, J. K.
Draper Company.
Entwistle, T. C., Co.
Philadelphia Textile Machinery Co.
Whiteley, William, & Sons, Ltd.

Warp Stop Motions.
American Textile Appliances Co.
Coldwell-Gildard Co.
Draper Company.

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Barber & Coleman Co.

Washers (Cloth).
Arlington Mch. Works (Arthur Birch, prop.)
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Hunter, Jas., Machine Co.
Kenyon, D. R., & Son.
Philadelphia Drying Machinery Co.
Textile Finishing Machinery Co.

Washing Soda.
Ford, J. B., Co.

Watchman's Clocks.
Nanz & Co.
Pettes & Randall Co.

Water Chemists.
Scaife, W. B. & Sons Co.

Water Purifiers and Filters.
Philadelphia Water Purification Co.
Scaife, W. B., & Sons.

Water Softeners.
Ford, J. B., Co.
Philadelphia Water Purification Co.
Scaife, W. B. & Sons Co.

Water Towers.
Caldwell, W. E., Co.
Stevens Tank & Tower Co.

Water Wheels.
Hunt, Rodney, Machine Co.
Leffel, James, & Co.
Risdon-Alcott Turbine Co
Smith, S. Morgan, Co.

Water Wheel Governors.
Cohoes Foundry & Machine Co.
Leffel, James, & Co.
Replogle Governor Works.

Whistles.
Lunkenheimer Co.

Winders.
Altemus, J. K.
Atherton, A. T., Machine Co.
Easton & Burnham Machine Co.
Foster Machine Co.
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Lindsay, Hyde & Co.
Payne, George W., & Co.
Universal Winding Co.
Whiteley, William, & Sons, Ltd.

Winders (Back).
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Winders (Hosiery).
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Foster Machine Co.
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Universal Winding Co.

Wire Stitching Machines.
Beck, Chas., Paper Co., Ltd.

Wood Pulleys.
Reeves Pulley Co.
Saginaw Manufacturing Co.

Wool.
Stoddard, Haserick, Richards & Co.
Tierney, Frank A.

Wool Compound.
Excelsior Wool Compound Co.

Wool and Waste Dusters.
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Philadelphia Textile Machinery Co.
Sargent's, C. G., Sons.
Schofield, Wm., Co.
Whittle, Jas. H.

Wool Cleaning Compound.
Ford, J. B., Co.
India Alkali Works.

Wool Combing Machinery.
Crompton & Knowles Loom Works.
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Stoddard, Haserick, Richards & Co.

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American Tool & Machine Co.
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Crompton-Thayer Loom Co.
Curtis & Marble Machine Co.
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Philadelphia Textile Machinery Co.
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Schofield, Geo. L.
Schofield, William, Co.
Stoddard, Haserick, Richards & Co.
Textile Finishing Machinery Co.
Vacuum Dyeing Machine Co.
Whiteley, William, & Sons, Ltd.
Whittle, Jas. H.
Woonsocket Machine & Press Co.

Wool, Non-shrinking Process for.
Heyer, Charles H.

Wool Oiling Apparatus.
Harwood, Geo. S., & Son.

Wool Oils.
Borne, Scrymser Co.
Excelsior Wool Compound Co.

Wool Shoddies.
Riverdale Woolen Co.
Slack, Wm. H. H., & Bro.

Wool Spinning Machinery.
New Process Spinning Machine Co.

Wool Washing, Preparing and Drying Machinery.
American Drying Machinery Co.
Hunter, Jas., Machine Co.
Leigh, Evan A.
Philadelphia Drying Machinery Co.
Philadelphia Textile Machinery Co.
Riley, C. E., & Co.
Rodney Hunt Machine Co.
Sargent's, C. G., Sons.
Stoddard, Haserick, Richards & Co.

YARN, THREADS, ETC.

Banding.
Moore, C., & Co.
Sternberg, Fred, & Co.
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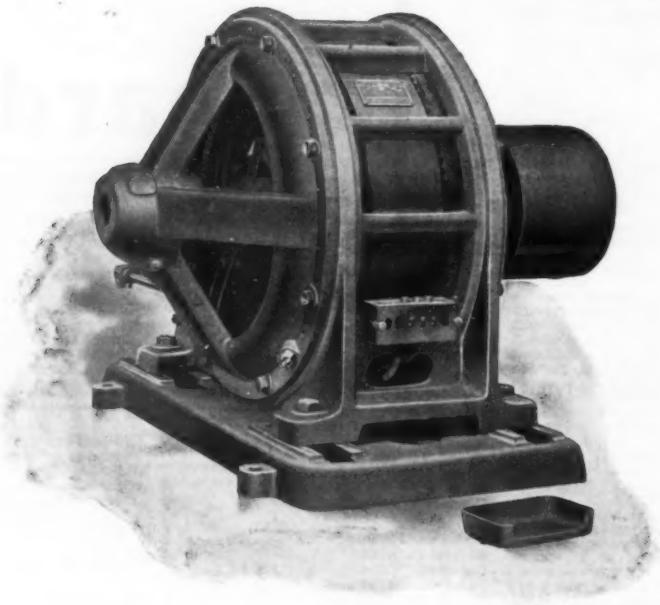

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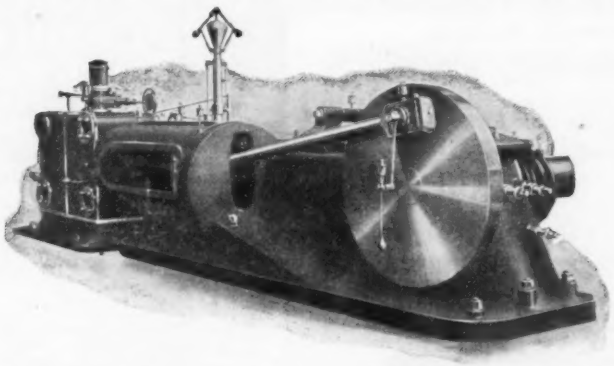

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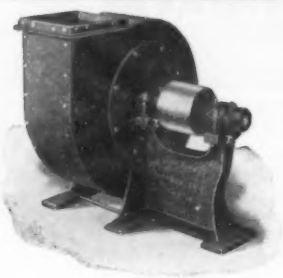

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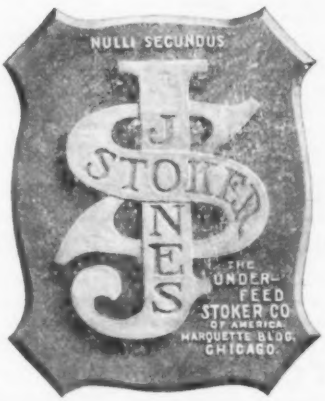

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K. OEHLER'S

Branch Offices:
19 Pearl Street, Boston, Mass.
31 So. Front Street, Phila., Pa.

Aniline Salt and Oil.
Aniline Colors.

DYESTUFFS,
DYEWOOD EXTRACTS.

SPEED & STEPHENSON,

BUILDERS, IMPORTERS AND DEALERS,

TEXTILE MACHINERY.

We have as large a stock of Second-hand Machinery as there is in New England.

Note these Special Lots of Cotton, Woolen and Worsted Machinery.

Four (4) Wool Washers, 3 Bowls.
One Sargent Wool Dryer.
One 60″ Breast Worsted Card.
One 48″ Licker-in Worsted Card.
Two Backwashers.
Eight Ball Winders for Combs.
Several Gill Boxes for before and after Combs.
Two Noble Combs.
Several Can and Spindle Gill Boxes.
Several Sets of Drawing.
Forty Reducers and Rovers.
Twenty Cap Frames, mostly Prince Smiths.
Cap Trap and Ring Trap Twisters.
Ten Sets Woolen Cards.
Ten pair Woolen Mules.
Twenty 48″ Bramwell Feeds.
Thirty-five Knowles Looms, 72″.
Fifteen Knowles Looms, 92″.
Sixty Crompton Looms, 92″.
1 4-Bowl Crab.
100 38″ Top Flat Cards.
One Kitson Cotton Opener.
One Three cylinder Lapper.
Two Klauder Weldon's Dyeing Machines.

10,000 CAPS, TUBES AND SPINDLES, ALL SIZES, WITH TENSION PULLEYS.
1,000 SPINNING TOP ROLLERS, WOOD BOSSES, 3 1-2 in. PITCH.

This machinery must be moved in order to make room for a large consignment now on the way.

170 Summer St., BOSTON. MASS.

WANTS, FOR SALE, ETC.

Rates, 15 cents a line per issue when replies are sent in care of TEXTILE WORLD RECORD to be forwarded. If replies go direct to advertiser the rate is 10 cents per line per issue. Count seven words to a line and include side head and address. Cash must accompany the order for these ads. If such ads. are "displayed" the rate is $2.00 per inch single column each time.

For Sale.

One 30 K. W. Belt driven General Electric generators, with switchboard and cables complete, also 50 H. P. Ball engine, 9 x 12, to drive same.

66 Clipper looms, single box, 20 harness, dobbies 36 in. reed space.

4 Altemus skein winders, 30 spindles each.

1 Fairmount Machine Works, skein winder, 30 spindles.

5 Lever & Grundy skein winders, 60 spindles each.

Address, "Sale," care Textile World Record, Philadelphia, Pa.

FOR SALE

High grade underwear factory, located in the middle west. Labor conditions first-class. Now running on paying basis. Full particulars upon application. Address "R," care of Textile World Record, Boston, Mass.

WANTED.

Odd lots of yarns of any kind for spot cash. Send samples and prices. M. SCHNELLBACHER, 850 Dekalb Ave., Brooklyn, N. Y.

FOR SALE.

A Four Sett Up-to-date Woolen Mill,

situated in the wool district of Oregon. Ample water power. Electric plant for lighting. Automatic sprinkling system. Cheap fuel. Central location. Skilled help.

Main buildings 60x120 and 60x160. Three stories and basement. Picker house and office. Machinery consists of four setts cards, five mules, 23 broad looms, wire napper, press, shear, fuller, washer, driers, extractors, etc., in good order, modern, and up-to-date, suitable for any class of goods. For further information address "G," care of Textile World Record, Boston, Mass.

Harrisburg, Pa.
An Ideal Shipping Point

Have you ever experienced the need of a central distributing point for the eastern field? Many manufacturers now carry stocks of goods here. The best located man often gets the trade. You can RENT Large, Centrally Located Warehouses with attendants, of us, or you can BUY our former plant (we now occupy our new factory), well located for manufacturing or warehouse purposes.

Harrisburg Foundry and Machine Works

BUSINESS OPPORTUNITY.

WEAVING MILL IN OPERATION AND GOOD CONDITION FOR SALE.

Parties—desiring to retire from active management, because of other business engagements, will sell complete weaving plant.

76 Knowles and Clipper looms, Reed space 38 and 44 inches, for one shuttle Cotton, Woolen, Mohair or Linen Dress goods. Rent of building reasonable. Water power. Plenty of cheap labor and good weavers. No strikes. Located 12 miles from N. Y. City. Ten other woolen mills in the same town. Can take possession at once. Address

A. H. A.,
Box 22, Station A, New York.

ROOMS TO RENT
WITH POWER.

40 x 170, new mill, low rent and insurance.

D. H. STROUD, 4200 No. 6th St., Philadelphia, Pa.

Capital Wanted. Parties now engaged in manufacturing would like additional capital to place a specialty on the market. Address Specialty, care of Textile World Record, Boston, Mass.

C. WOLFENDEN

2257 NORTH 2d STREET, PHILADELPHIA, PA.

Dealer and Jobber in

Textile Machinery, New and Second Hand

Will buy Odd Lots of Yarn of Any Kind
Send Samples and Price

FOR SALE.

One Acme Full Automa ic double heel and toe machine, made by Mayo Knitting Co., 176 needles.

One McMichael & W. Ribber, stop motion attached.

One Beattie Looper.

The above are brand new machines with latest improvements. Never used.

For particulars address JAMES BUCKLEY, 829 Congress St., East, Detroit, Mich.

WANTED.

Manufacturers contemplating starting factories in Canada will hear of something to their advantage by addressing,

Secretary Board of Trade,
INGERSOLL, ONTARIO.

Woolen Machinery Wanted. Parties owning 3 or 4 set up to date Woolen Machinery can learn of something to their advantage by addressing P. O. Box 606, Oregon City, Ore.

MEN WANTED.

Same rates as Wants, For Sale, etc. Manufacturers will be furnished, without charge, with the names of suitable men who are entered on our list, and can usually supply their wants in this way.

HOSIERY SUPERINTENDENTS AND FOREMEN WANTED.

Good Superintendents and Knitting Foremen who understand the manufacture of Seamless Hosiery. We wish to hear from first-class men who may be in want of such positions. Those unemployed preferred. Address TEXTILE WORLD RECORD, 299 Devonshire St., Boston.

BRIGHT LOOM FIXER WANTED.

One that is familiar with Crompton & Knowles Moquette Axminster looms, or one that is bright and ambitious to learn. Good position when learned.

D. H. STROUD, 4200 No. 6th St., Philadelphia, Pa.

WANTED.

A Competent Mill Man (German preferred), one thoroughly **capable of styling** a well equipped Mill, manufacturing Ladies' Dress Goods, both Plain and Fancies. Apply by letter stating qualifications, etc. "T," care of Textile World Record, 123 Liberty Street, New York.

Wanted. Experienced superintendent or foreman with small capital and services to associate with party about to organize for manufacture. Address, Associate, care Textile World Record, Boston, Mass.

Wanted. A competent and experienced dyer for silk and cotton skein, also piece dyeing of silks and plushes. A good salary and a permanent position to the right party. Address, 134 Amity St., Brooklyn, N. Y.

WANTED.

A competent and reliable young man as knitting foreman and manager for the manufacture of fine high grade men's underwear. Must be fully acquainted with all the details of the business, including finishing, etc. To the right man a permanent position is offered at a good salary. Address Knitting Foreman and Manager, care Textile World Record, Boston, Mass.

WANTED—WEAVER FOREMAN

for new mill northern part of New York State, on Silk Warp and Silk Mixed Fabrics. State experience and references. Good salary to a first-class man. All communications kept strictly confidential. MANHATTAN SILK CO., 35 Mercer St., New York City.

Wanted. Secondhand in Finishing Room of Hosiery mill. Mill of 3,500 dozen capacity seamless hosiery. Can give employment to secondhand in finishing department. Must thoroughly understand getting out samples and be able to assist in handling portion of help. Work includes ladies' hose and ribbed goods in different grades and gauges, including fancies and some full-fashioned stock. State wages wanted, with references as to ability and character. C. D. E., Textile World Record.

Wanted. Overseer of Knitting Room for Hosiery Mill. Mill making 1,700 dozen seamless hosiery daily. Various gauges of men's, ladies' and ribbed goods, including fancies. Can give employment to overseer who thoroughly understands hosiery machinery and who can handle help. Mostly Standard machines; some Mayo's. Give references as to experience in handling help, knowledge of machinery and character. Address E. K. A., care Textile World Record, Boston.

SITUATIONS WANTED.

The following advertisements are a portion of those of superintendents and overseers of whom full particulars are on file at this office. Manufacturers who may be in need of such men may address them in care of Textile World Record, or state their requirements directly, and the addresses of suitable men will be furnished without charge.

Any paid in-advance subscriber may have his name placed on the list of those desiring positions, upon filling out the requisite blanks, furnished upon request. Correspondence is confidential.

Mr. C. T. Donlevy, a practical mill overseer and superintendent, who has a wide acquaintance with mill men, is now a member of the Textile World Record staff, and gives special attention to this department. He would be pleased to hear from any of his friends who may be interested.

COTTON SUPERINTENDENTS.

Superintendent or assistant of silk or cotton mill. Worked on plain and fancy ribbons and all classes of goods in broad silks, dress silks and tie silks, also Jacquard work. References. 3185, Textile World Record.

Superintendent or assistant superintendent cotton mill. Age 30; American, single. All kinds of cotton goods. Can take place at once. 3199 Textile World Record.

Superintendent of broad silk mill wants position. Age 39; English; married. Worked on mostly plain goods. Could be of good service to some reliable concern just starting up. Has small plant of his own which he would put in as stock with a first-class concern. 3154, Textile World Record.

Superintendent. Would like position in South. Not particular about salary to start. Machinist and thoroughly acquainted with all kinds of card room machinery, also spinning frames. Taken superintendent course in textile school and has had 23 years of practical experience in the mill, mostly on fine yarn work. 3044, Textile World Record.

Cotton Mill Superintendent, or assistant. Age 34; married. Worked on cotton machinery on coarse and medium numbers. Textile school education in designing, carding and spinning. 3003, Textile World Record.

Superintendent of cotton mill or overseer. Handled all kinds and numbers in yarn mills, cloth mills, colored warps, etc. Speeder, warper, spooler and spinner in the family. Age 48; American; married. 3219, Textile World Record, Boston, Mass.

Superintendent of Cotton Yarn Mill or duck mill. A young man; American; married. Prefers position in the South. Worked in different departments, spinning, spooling, twisting, warping, reeling and balling and now ready for a superintendent's place. Unquestionable references. 3087, Textile World Record.

Superintendent. All kinds of fancy cotton, white and colored, plain and fancy, jacquard and box work, also silks and worsteds. Would take good overseer of weaving position. 3120, Textile World Record.

Superintendent, or overseer of carding. Worked on combed and carded yarn from 20 up to 140, twilled sateens, lawns, sheetings and shirtings. English and American machinery. 3036, Textile World Record.

Asst. Superintendent or Overseer. 20 years' experience as overseer in both England and Scotland over combing, drawing, spinning, etc. Can work both long and short wools, get up all kinds of mixtures, instruct the shading of batches, etc. Has good references. 43 years of age. 3086, Textile World Record.

Superintendent of yarn mill or plain cotton weaving or assistant. 33 years of age; American. Worked on all classes of yarn up to 50s and plain weaving. Married. 3226, Textile World Record.

Cotton Mill Superintendent. Overseer of weaving on mule spindles. Worked on fancy lenos, jacquards, fancy lappets, plain, fine and coarse cotton goods. Age 36; French-American. 3232, Textile World Record.

Assistant Designer on cotton or assistant in the weave room. Worked plain twills, sateens and dobby cloth. Age 21; English; single. 3230, Textile World Record.

WOOLEN SUPERINTENDENTS.

General Manager, agent, superintendent or designer. Worked on everything from fine worsted to a blanket. Good experience. Aged 37; American; married. 3172, Textile World Record.

Superintendent or Designer. Age 37; American; married. All grades of woolens and also cotton warp goods. Will not go South or to Canada. 3124, Textile World Record.

Asst. Agent, superintendent or mechanical engineer in woolen or carpet mill of any kind. Age 30; married. Excellent references. 3178, Textile World Record.

Manager, superintendent or designer. Age 30; English; married. Experienced in England and in this country. Mohairs, all classes of worsted suitings, plain and fancy dress goods. 3184, Textile World Record.

Superintendent of worsted yarn plant or overseer of drawing and spinning. Worked on Australian, English, domestic woolens, mohair, alpaca, spun from 8s to 70s, also carpet yarn. Age 38; American; widower. First-class references. 3221, Textile World Record, Boston.

Superintendent or boss weaver. 15 years' experience in worsted, woolen and silk goods. Graduate of Philadelphia Textile School. 32 years old; married. Good manager of help. American. 3119, Textile World Record.

Superintendent and Designer. Age 30; American; married. Cotton warp, worsted and silk vestings, tapestry curtains, plaid backs, broadcloth, etc. 3146, Textile World Record.

Woolen Superintendent. Worked on worsted ladies' dress goods, cassimeres, kerseys and meltons. Also a first-class man on fancy robes, bed and horse blankets. 48 years of age; married. 1598, Textile World Record.

Woolen Superintendent or designer. Worked on men's wear, worsteds, fancy cassimeres and ladies' dress goods. At present employed, but wishes a better position. 28 years of age; English, single. 3234, Textile World Record.

Assistant Superintendent. Worked on Woolens and worsteds of all kinds. Graduate of a Textile School. American; 23 years of age; single. 3228, Textile World Record.

Woolen Superintendent, manager or designer. Worked on worsted and wool combination, all wool, cotton mixed kerseys, overcoatings and ladies' dress goods. 46 years of age. 3235, Textile World Record.

Woolen Superintendent of small mill or assistant superintendent in large mills, or boss finisher, by practical mill man raised in the business. Worked through card room, dressing and weave rooms, and all the departments of finishing. Overseer 20 years; strictly temperate; have family: Scotchman. 3200, Textile World Record.

Woolen Superintendent and designer. Worked on men's wear, worsteds, fancy cassimeres, smoking jackets, over-cloth, ladies' dress goods. 28 years of age; English; single. 3234 Textile World Record.

Superintendent. A man now under engagement as superintendent in a first-class mill, desires to correspond with any party in want of a competent and reliable man. Experienced on all kinds of woolen goods and a good manager. Good reasons for changing. Correspondence confidential. Address, First Class, care Textile World Record, Boston, Mass.

COTTON CARDERS.

Carder in Cotton Mill. Coarse or fine, white or colored, hosiery, Egyptian, etc. Age 35; Canadian; married. 3029, Textile World Record.

Overseer of Carding. Large experience on all kinds of work and both English and American systems. Can furnish first-class references. Had charge of carding in some of the best New England mills. 3009, Textile World Record.

Overseer of Carding or cotton ring spinning. Worked on carded and combed Peelers, Egyptian, and Sea Island cottons, making yarns from 8 to 80. 3015, Textile World Record.

Overseer of Carding. Has held all positions in picker and card rooms. White and colored goods, 5s to 40s. 3070, Textile World Record.

Overseer of Carding Mill. All kinds of fine yarns. Started up two of the largest card rooms in New England. Considered an expert in the manufacture of combed yarns from the bale to the finished article. First-class recommendations. 1745, Textile World Record.

Overseer of Cotton Carding. Worked on all classes of cotton, carded and combed, in counts to 135s. Will not go West or South. 3061, Textile World Record.

Overseer of Carding Department. Age 38; English; married. Plain and fancy goods; both combed and carded, Cotton Sea Island, Peruvian, Egyptian, Peeler, etc. Good references. 3196, Textile World Record.

Secondhand Carding or card grinding in a large mill. Worked on all white and colored goods, cotton from 4s to 70s. Good references. Age 29; German; unmarried. 3217, Textile World Record, Boston, Mass.

Overseer or secondhand in preparatory department of long chain beaming, quilling, tape dressing, warping and spooling. A Scotchman; married. Will not go West or South. 3156, Textile World Record.

Overseer of Cotton Carding. Worked on all classes of cotton, carded and combed, in counts to 135s. 3061, Textile World Record.

COTTON SPINNERS.

Overseer of Ring Spinning, spooling, long chain beaming, slashing and drawing-in. All kinds of fancies, sheetings, etc. $3.00 per day up. 3202 Textile World Record.

Overseer of Ring Spinning. Aged 42; American; married. Ginghams, sheetings, awnings, denims, etc.; $3 to $4 per day. 3018, Textile World Record.

Supt. of Cotton Mill, or overseer of mule or ring spinning is open to a position; 16 years' experience in Northern mills, on yarns, denims, awnings, apron checks, bicycle suitings, shirtings, etc., etc. Familiar with all well-known makes of cotton machinery; 29 years old; American; married. Can give references from large Massachusetts mills. 1527, Textile World Record.

Overseer of Cotton Mule Spinning. Understands Mason and English makes of mules. Has worked in mule room sixteen years, five years as second hand and a year and a half as overseer. 28 years old; married; steady and temperate. Would like to get work in N. E. or New York states. Has worked on colored hosiery yarn and filling. 1822, Textile World Record.

Overseer of Mule Spinning who has had a wide experience in large New England mills on yar ranging from 24's to 160's is open to a position. years old; American. Good references. 2003, Textile World Record.

Overseer of Spinning. Age 34; married. Good experience. 20s to 90s Egyptian and American cotton. 3125, Textile World Record.

WOOLEN CARDERS.

Overseer of Combing, washing, carding. Age 36, English, married. All classes of wool. Good experience and first-class recommendation. 3094, Textile World Record.

Overseer of Woolen Carding. Would accept secondhand position. All wool, cotton and wool, shoddies, mixes, worsteds. Does not wish for position on shoddy, but would consider one. Blankets, suitings, flannels. Understands spinning. 3093, Textile World Record.

Carder and Spinner. Been overseer 32 years, making every variety of cassimere, flannels, overcoatings, cloakings, dress goods, etc. Married; American. 3132, Textile World Record.

Overseer of Carding. Age 30; American married; Nearly all classes of goods. Good experience and references. Address 3170, Textile World Record, Boston.

Secondhand in wool card room. Age 23; American. Wool and cotton mixes. References. 3198, Textile World Record.

Carder, or carder and spinner. Age 49; American. Has worked on all kinds of woolens, and of late on shoddy and cotton mixes. Is familiar with Davis & Furber machines. Excellent reference from past employer. 1944, Textile World Record.

Carder, or carder and spinner. German; married. Worked on all wool, wool and cotton, and shoddy mixes. Ten years' actual experience, and can furnish first-class recommendations. 2057, Textile World Record.

WOOLEN SPINNERS.

Roll Coverer wants an opening for work. Can cover cotton or worsted rolls, make aprons, or better, has had large experience. Can furnish tools. Work by piece or day. 1803, Textile World Record.

Superintendent woolen mill. Age 47; English; married. Wants New England or Middle States. 10 years' experience in first-class N. E. mills. 2028, Textile World Record.

Overseer of Warping, Spooling and Winding. Dress goods and cloth. Will not go to Canada. Aged 40; married. Good experience. References. 3027, Textile World Record.

Woolen Finisher. First-class. Familiar with all classes of goods and machinery. Can take full charge from loom to case. Has always been very successful. 1244, Textile World Record.

Boss Spinner. Age 34; Scotch. Worked on all wool, cotton and wool and shoddy mixes. Will not go West, South or to Canada. References. Good experience. 3032, Textile World Record.

Overseer Woolen Spinning. Cassimeres, beavers, kerseys, dress goods, flannels, etc. Good experience. 3177, Textile World Record.

Boss Woolen Spinner. Would take a good secondhand job. Used to Davis & Furber and Johnson & Bassett machines. Worked on all kinds of goods. First-class references. 3215, Textile World Record, Boston.

DESIGNER

On Narrow Fabrics and Elastic Webs wants position. Competent to assist Manager.

Address "Designer," care Textile World Record, Philadelphia Pa.

POSITION WANTED.

Foreman of Knitting Room. Spring needle or flat knitting. Fleeces of all kinds and guages, balbriggan from 20 to 30 guage. Familiar with Tompkins Bros. and Campbell & Clute machines. Would like to go South.

Address Needle, care Textile World Record, Boston.

COTTON WEAVERS.

Superintendent of cotton weaving and spinning mill. English. Quilts, damasks, brocades, ribbons, etc. 3175, Textile World Record.

Overseer of Weaving. Good experience and reference. Worked on lawns, sheetings, sateens, dimities, fancies, etc. 3188, Textile World Record.

Overseer Cotton Weaving. Plain and a variety of fancies, lenos, etc. Good experience. A young man; English; married. 3147, Textile World Record.

Overseer of plain cotton weaving. Age 27; American; married. Familiar with Whitin, Mason, Colvin and Draper looms. Worked on prints, sheetings, cambrics, lawns, twills, etc. 3143, Textile World Record.

Overseer of Weaving. Worked on sheetings, twills, sateens and fancies. Wants not less than $18 per week. 3157, Textile World Record.

Overseer of Weaving. Englishman; 33 years of age; married. Worked on fine lawns, sheetings, sateens and fancies, coarse drills, twills, bicycle cloth, automobile cloth for tires. Familiar with Whitin, Crompton, Knowles, Mason, Kilburn & Lincoln and Lowell machines. 3073, Textile World Record.

Overseer of Weaving. Worked on all kinds of cotton goods, plain and fancy, including Turkish and cotton towels, also fancy worsted dress goods. Age 39; English; married. 3236, Textile World Record.

WOOLEN WEAVERS.

Overseer of Weaving, also designer. Men's wear, woolen and worsted, and fancies of all kinds, cotton worsteds, dress goods. Knowles and Crompton looms. Age 35. 3056, Textile World Record.

Boss Weaver or assistant superintendent. Worked on all kinds of worsteds and woolens. Crompton & Knowles looms. Wants place at once. Middle aged; English; married. Good experience. Excellent references. 3062, Textile World Record.

Boss Weaver. Aged 38; married. Cassimeres, beavers, kerseys, dress goods, flannels, blankets. Worked on Crompton & Knowles broad looms. Good recommendation. 3066, Textile World Record.

Overseer of Woolen Weaving, or would take a secondhand job. 35 years old; married. Familiar with Crompton & Knowles looms. Good references. 3089, Textile World Record.

Overseer of Weaving or designer. Age 29; American; married. Thibets, meltons, kerseys, worsteds and cotton worsteds. Crompton & Knowles looms. Good experience. First class recommendation. 2051, Textile World Record.

Boss Weaver, second hand or loom fixer. Age 30; married. Wants $3 per day. Men's wear, dress goods and all kinds of fancy worsteds. Crompton & Knowles looms. Reference. 3182, Textile World Record.

Boss Weaver and designer. All grades of fancy dress goods, woolen and worsted, cotton and cotton mix kerseys, coverts and venetians. Plain and fancy men's wear. 3181, Textile World Record.

Overseer of Weaving. Worked on all kinds of fancy dress goods, cotton, worsted and woolen, also men's wear. Age 31; English; unmarried. 3159, Textile World Record.

Overseer of Weaving, or weaving and designing in first-class mill wants position. Will not go South or to Canada. $4.00 per day. Can furnish excellent references. 3056, Textile World Record, Boston.

Woolen Boss Weaver. Worked on worsteds, woolens of all kinds, also dress goods. American; 38 years of age; married. 3231, Textile World Record.

DYERS.

Wanted. Position by First-class Dyer. Fifteen years' experience on raw stock, wool, cotton, shoddy, cross dyes and all kinds of piece dyeing. Age 35 years. Temperate and good manager of help. First-class references. Address Box 28, Textile World Record, Boston.

Boss Dyer and bleacher. Scotch. Good experience and references. Underwear. 3195, Textile World Record.

Boss Dyer in a 3 to 5 set mill, or secondhand dyer, Raw stock and shoddy. Wants Mass., R. I., or Conn. 3187, Textile World Record.

Boss Dyer in woolen mill. Would consider a good second hand job. Worked on broadcloths, dress goods, raw stock. Won't go South or to Canada. 3180, Textile World Record.

Superintendent of cotton bleachery is open to a position. Excellent experience. American; married; aged 37. Familiar with cambrics, sheetings, shirtings, lawns, sateens, drilling and fancy weaves. 3153, Textile World Record.

Dyer on all grades of worsteds, kerseys, broadcloths, knit goods of all descriptions, alpacas, mohair lining, ladies' dress goods, worsted yarn, cotton yarn, wool and cotton raw stock. Age 41; English-American. 3214, Textile World Record, Boston.

Secondhand Dyer. Yarn and cotton pieces. Experienced on all classes of goods on a small scale. Age 23; unmarried. 3171, Textile World Record, Boston.

Overseer of Dyeing on all classes of worsted, woolen and union goods. Can take position on two weeks' notice. Age 26; American; single. First-class references. 3224, Textile World Record, Boston.

Secondhand in dyehouse. Would accept a position as salesman. Worked in first-class worsted and woolen mills. Age 26; American; unmarried. Can take place on short notice. 3211, Textile World Record, Boston.

Overseer of dyeing and finishing, all kinds of worsteds, woolen, fancy mix, indigoes, and raw stock. 36 years of age; married. 3233, Textile World Record.

FINISHERS.

Finisher and assistant superintendent wants position. Age 31; American; married. Good experience on all kinds of goods, especially on unions and satinets. Good references. Will not go West, South or to Canada. 3139, Textile World Record.

Boss Finisher. 25 years' experience on all classes of goods, woolen and worsted and cotton mixtures of all grades. 3142, Textile World Record.

Boss Finisher. American. Cheviots, cassimeres, beavers, dress goods, etc. Wants $2.50 to $3 per day. 3123, Textile World Record.

Boss Finisher or Secondhand wants position. Twenty years in finishing room; 8 years secondhand at three mills on woolens and worsteds. Good grinder. Good reference. Married; age 33. Strictly temperate. Address Finisher & Grinder, care Textile World Record, Boston, Mass.

Overseer of Finishing Room. Cut and full fashioned balbriggan ribbed goods. Familiar with Union Special, Wheeler & Wilson, Willcox & Gibbs, Merrow, etc. Excellent references. Address 3168, Textile World Record, Boston.

Superintendent of bleaching and finishing cotton goods. Worked on all kinds of cheese cloth, buttercloth, sheetings, quilts, cambrics, long cloth, ducks and drills. Age 31; English; married. 3218, Textile World Record, Boston, Mass.

KNITTERS.

Foreman of Knitting Room. Age 29; American, unmarried. Fleece of all kinds and gauges. Balbriggan from 20 to 30 gauge. Flat work wool goods. Tompkin Bros. and Campbell & Clute machines. Will not go South. 3204, Textile World Record.

Secondhand knitter and fixer. Familiar with Lewis Jones, N. & T., S. & F., S. & W. and Brinton machines. Wants position at once. Ten years in present place. Ladies' and children's underwear and union suits. Will go anywhere. Age 28; unmarried. 3209, Textile World Record, Boston.

Superintendent of a knitting mill. Full fashioned seamless, worsted, merino, cotton, children's, misses' and ladies' hosiery and men's half hose. A fixer and one knitter and a looper in family. Age 41; German; married. First-class references. 3222, Textile World Record, Boston.

Knitting Foreman. Age 29; American; married. Worked on all kinds of ribbed underwear made on circular latch needle machines, all makes and gauges of latch needle machines, and slightly with Tompkins, Crane and Cooper latest spring needle rib machines. Can take place on week's notice. 3206, Textile World Record, Boston.

Foreman or assistant on spring needles. Worked on non-shrinkable woolen and worsted goods, fleece-lined, balbriggan and regular flat work. Used to Campbell & Clute and Tompkins machines. 30 years old; Irish and married. Can take position at once. 3205, Textile World Record, Boston, Mass.

Foreman. A young man of several years' experience as foreman knitter on single and double thread, flat goods, plushes and fleeces, wants a position of any kind where he will have a chance to learn latch needle knitting. No reasonable offer refused. 3038, Textile World Record, Baston.

Boss Knitter or machine fixer. Worked on plain lace and drop stitch hosiery. Good reference; 22 years of age; single. 3237, Textile World Record.

DESIGNERS.

Designer on any class of dress goods, waistings, mantle cloths, fine shirtings, etc. 3203 Textile World Record.

Assistant Designer or asst. superintendent. Dress goods and men's wear. Age 25; Austrian; unmarried. Wants position in Philadelphia or suburbs. 3193, Textile World Record.

Designer on cotton, or assistant on woolen, worsted or Jacquard work. Age 31; American; unmarried. 3190, Textile World Record.

Designer in small mill or assistant in larger concern. Serges, cassimeres, shawls, and fancy worsteds and cotton goods. Wants only New England or Pennsylvania and New York. 3191 Textile World Record.

Designer. Age 29; American. Understands Jacquards and would like to get into a mill making ladies' dress goods, etc. 3186, Textile World Record.

Designer or superintendent. A German, 26 years of age. Dress goods and men's wear. Experienced in Germany and this country. 3163, Textile World Record.

Assistant Designer or assistant superintendent of woolen or worsted mill. A young man; American; unmarried. Men's wear, dress goods, silk brocades, damask, etc. 3160, Textile World Record.

Designer, woolen and cotton novelties. Used to fancy cassimere, ladies' dress goods, suitings and men's wear worsted, cotton and wool mixes. First-class references. Age 24; Scotch; single. 3212, Textile World Record, Boston.

Designer or boss weaver. Age 35; American; married. Worked on all kinds of worsteds, cheviots, men's wear, dress goods and coat linings. Used to Knowles and Crompton looms. First-class references. Can take position one week's notice. 3210 Textile World Record, Boston.

Nearly $2.00 a Day Increase

Previous to enrolling for the Complete Cotton Course with the International Correspondence Schools, George W. Lehman, of Huntsville, Ala., had little education, having worked in mills since 12 years of age. Through the training received in his Course, his wages have been increased nearly $2 a day. In a letter to the Schools, Mr. Lehman says, "Your Course has been a great help to me, and I therefore recommend the I. C. S. to all textile workers who wish to advance."

By our method of training, by mail, thousands of ambitious textile workers have been able to advance in salary and position. You do not have to give up your present employment—we train you in your spare time.

We can help you qualify for a position as Superintendent; Designer; Boss Carder; Boss Spinner; Boss Weaver; Bookkeeper; Stenographer; Mechanical Draftsman; Ad Writer; Show-Card Writer; Etc.

Write, stating which subject interests you.

International Correspondence Schools

BOX 836, SCRANTON, PA.

MISCELLANEOUS.

Overseer of web drawing, slashing, spooling and warping, on white cotton goods. 36 years of age; Irish; married. 3201, Textile World Record.

Overseer of plain and fancy dressing, spooling, warping, slashing, drawing-in, beaming and slubbing. 41 years of age; married. 3115, Textile World Record.

Overseer in winding, spooling and thread dressing. Age 34; Scotch; married. Also had some experience in beaming. Shoe and corset lacing, plain and fancy braids and tapes, fine ginghams and dress goods. 3192, Textile World Record.

Master Mechanic in cotton or woolen mill or cotton finishing plant. American; married. Good experience and reference. 3189, Textile World Record.

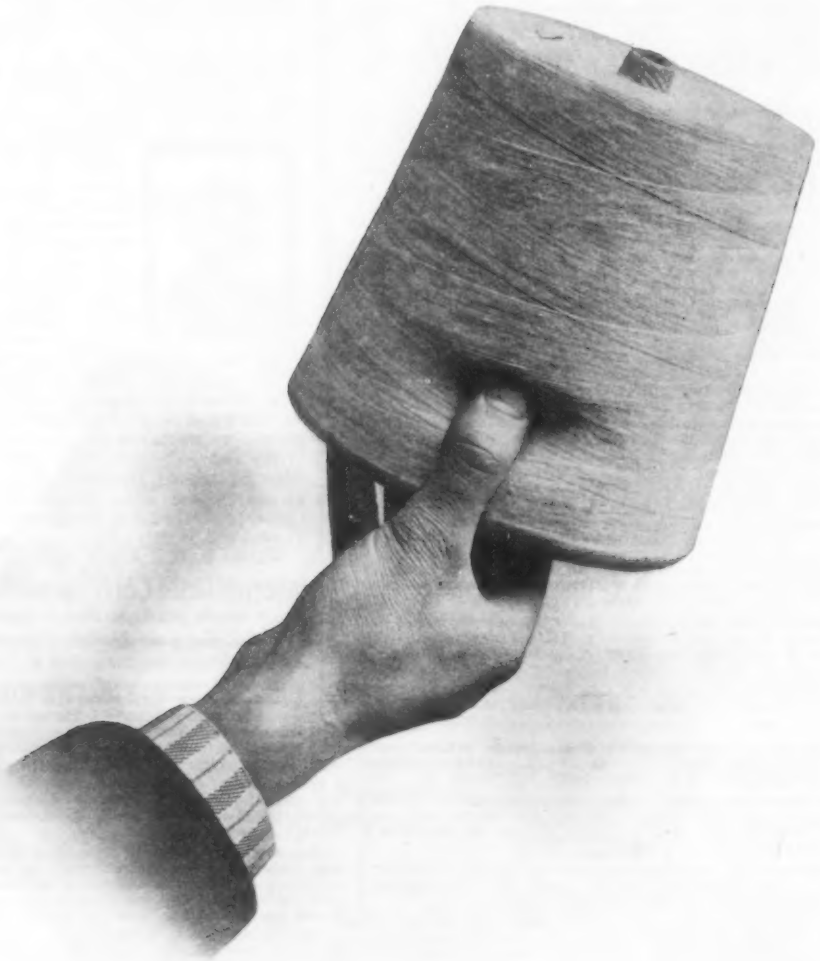
Salesman for shoddy or mill supply house, or machinery salesman. Familiar with all kinds of textile machinery. 3194, Textile World Record.

Second Boss or in advisory capacity for jacquard weaving. Familiar with almost every line of silk fabrics, also cotton backs, tapestry and upholstery goods, hammocks, table and bed covers, ribbons, etc. 3135, Textile World Record.

Loom Boss or asst. superintendent. All kinds of worsted goods for ladies' and gentlemen's wear and various classes of cotton goods. Worked in English mills and also in this country. 3151, Textile World Record.

Assistant Master Mechanic. Age 25; American; single. Used to all kinds of textile mill machinery. Can take position immediately. 3207, Textile World Record, Boston.

A Middle Aged Englishman, thoroughly understanding how to operate and fix jacquard and box looms, and prepare designs and pattern cards therefor, is open to accept a position this month. 3135, Textile World Record, Boston.



The Correct Cone for Knitting

No. 50 machine winds them soft with any degree of spacing, has lighter tension and pressure than any other winder, and by the saving in operating expenses pays for itself in a few months.

Universal Winding Company

95 SOUTH STREET, BOSTON

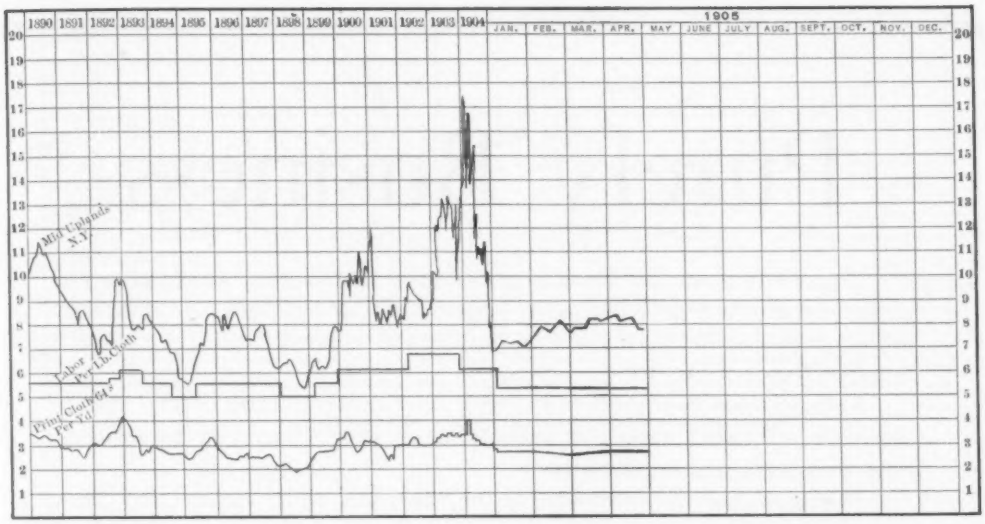

1890 1891 1892 1893 1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904
1905
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
Mid Uplands N.Y.
Yarn Per Lb. Cloth
Print Cloth 64x64 Per Yd.

CHART SHOWING RANGE IN THE PRICE OF COTTON TO DATE.

Cotton Market.

A remarkable feature of the cotton market is that the price is sustained around eight cents in spite of the large supply which has come into sight since September 1, a visible supply that has exceeded four million bales and the knowledge that Southern spinners are holding back large quantities of cotton which must sooner or later come on the market.

Eight-cent cotton seems cheap when compared with the quotations of last year, but it is fully equal to the average of the last 15 years. This support of prices comes from the unparalleled demand for cotton goods which has caused a boom in Manchester and stimulated the production of every Continental and American mill as well. The Chronicle estimates the visible supply on April 22 at 4,169,273 bales as compared with 2,972,646 in 1904, 3,346,640 bales in 1903, and 3,719,869 in 1902.

The movement into sight since September 1 in this and previous years is as follows:

1904-05	11,098,811
1903-04	9,304,145
1902-03	9,786,190
1901-02	9,541,467
1900-01	9,277,815
1899-00	8,393,114

The final report of cotton ginned during this last season has been issued by the Census Bureau and places the 1904 crop at 13,584,457 bales, the largest yield on record, and over 20 per cent. greater than the largest previous crop which was 11,235,000 bales in 1898. The present crop, 1904, exceeds that of 1903 by nearly 3,500,000 bales, and is being rapidly absorbed not only to fill up the depleted stocks at the mills, but also to supply the unprecedented demand for consumption.

Planting in the South is reported to be backward, but it is too early to venture any predictions regarding acreage or prospects of the new crop.

Yagi & Merrill,

Manufacturers' Agents.

General import and export business between

The UNITED STATES, JAPAN and CHINA.

Special attention given to COTTON FABRICS and to COTTON MILL MACHINERY.

OFFICES:

396-398 Broadway, New York City.
6 Teapo Street, Nagoya, Japan.

WEIMAR BROS. MANUFACTURERS OF **Cotton Mercerized Tapes,**

SPOOL TAPES, BINDINGS AND NARROW FABRICS FOR UNDERWEAR AND OTHER TRADES.

Phone Connections. **Works, 2046-48 Amber Street. PHILADELPHIA, PA.**

Purely Business

Argument is not necessary to prove some statements. Every scourer of wool or finished cloth has often experienced that stinging or burning sensation produced by soda ash or pure alkali when brought in contact with the hands while wet.

It then needs no argument to prove how much greater injury these materials will inflict upon the delicate wool fiber when you remember how they burn the hardened hands.

When you consider the facts as they are, you fully realize why the quality of the finished article is often much poorer than the quality of the raw material.

In the production of

Wyandotte Textile Soda

necessity has again proved the mother of invention. Wyandotte Textile Soda was designed to do a certain work—to effectively scour wool and finished cloth without causing the least injury to the wool fiber.

How well it does this work hundreds of mill men bear witness. Mr. Reader, can you say as much ?

None Genuine except with a card bearing this Trade Mark

In Every Package.

Wyandotte Textile Soda contains no fiery caustic and will not injure the most delicate fiber, yet it possesses greater scouring properties by far than either soda ash or pure alkali. Order from your supply house, and do it now.

This Soda was awarded the highest prize — Gold Medal — at the St. Louis Exposition.

The J. B. Ford Co.,

SOLE MANUFACTURERS,

Wyandotte, Mich.

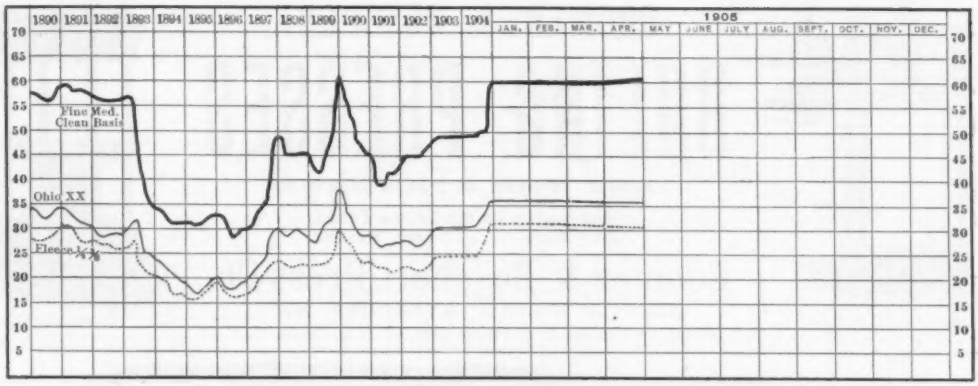


CHART SHOWING RANGES IN THE PRICE OF WOOL TO DATE.

Wool Market.

The rapidity with which the new clip has been purchased by dealers and transferred to manufacturers has deprived the wool market of most of the features of interest under ordinary conditions. A large proportion of the clip, estimated as high as 75 per cent. was sold before it was shorn from the sheep, and today the market presents the spectacle of manufacturers either supplied or eagerly searching for such grades as are required for their products. It is a sellers' market on all grades and prices are at the highest point which they have reached during the recent upward movement. Owing to the conditions under which the new wool has been secured by manufacturers there has been little opportunity for speculation.

The goods market is strong in sympathy with the position of wool and the high prices of raw material go far to confirm the prediction that higher prices must be secured on manufactured goods. The domestic clip having been disposed of, interest has been transferred to the foreign market where prices are still sustained on large sales. We are advised by Goldsbrough, Mort & Co., of Melbourne, Australia, that the wool selling season just ended has been a most satisfactory one to the Australian wool grower, all grades having sold at higher rates than have ruled since the boom year of 1899, and in addition the clip itself has shown an increase of over 150,000 bales as compared with 1903.

The principal features of the season have been the American and Japanese demand, both of which have been great factors in the satisfactory rates obtained. America purchased some 75,000 bales, which represent a larger quantity than has been bought for the United States for many years. Japanese purchases were mostly confined to good free scoureds, of which they were very eager purchasers.

The percentage of Australian wool sold in Australia again shows a gratifying increase, the sales this year having reached 81 3/4 per cent. of the total production, leaving only 18 1/4 per cent. consigned to London by Australian growers.

Wool and Woolen Goods Made **NONSHRINKABLE**
by the use of "Nevershrink Process."
May be applied at any stage of manufacturing. Write for Booklet.
CHARLES H. HEYER,
1501 Real Estate Trust Bldg. **Philadelphia, Pa.**

FOR WOOL Nevershrink PROCESS.

STANDARD QUALITY COMBED RAMIE TOPS and NOILS a Specialty. **RAMIE YARNS in All Numbers for All Purposes.**

Wool, Mohair, Camel Hair, Silk, and Ramie Tops and Noils.

FRANK A. TIERNEY,
Wool, Tops, Noils, Yarns.

Woolen, Worsted, Mohair, Ramie and Silk Knitting Yarns.

All Kinds of Yarn for Weaving Purposes. Special Fibres and Novelties for Woolen, Cotton and Silk Manufacturers.
Room 203, Wool Exchange Building, 260 West Broadway, New York.

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BOOMER & BOSCHERT

BALING PRESSES

ARE THE STANDARD

Hydraulic or Knuckle Joint
Any Size .. Any Power

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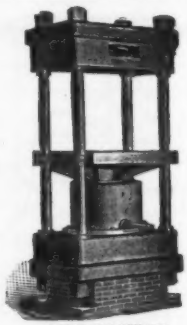
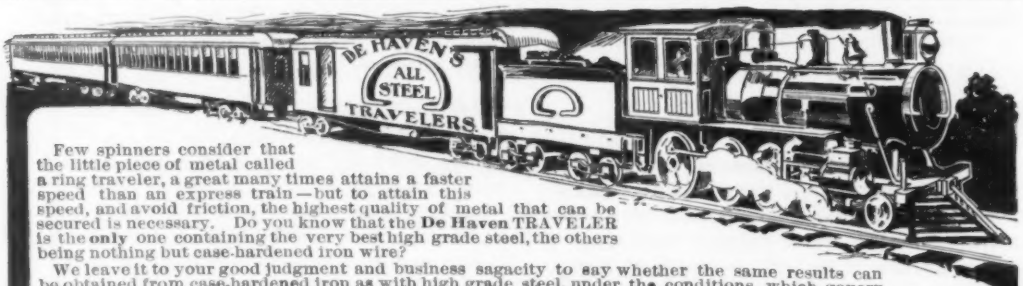
338 West Water S., SYRACUSE, N. Y.

Southern Agent, A. H. WASHBURN, Charlotte, N. C.



HYDRAULIC.



Few spinners consider that the little piece of metal called a ring traveler, a great many times attains a faster speed than an express train—but to attain this speed, and avoid friction, the highest quality of metal that can be secured is necessary. Do you know that the **De Haven** TRAVELER is the **only** one containing the very best high grade steel, the others being nothing but case-hardened iron wire?

We leave it to your good judgment and business sagacity to say whether the same results can be obtained from case-hardened iron as with high grade steel, under the conditions which govern ring spinning.

DE HAVEN MFG. COMPANY,
50-52-54 Columbia Heights, Brooklyn, N. Y.

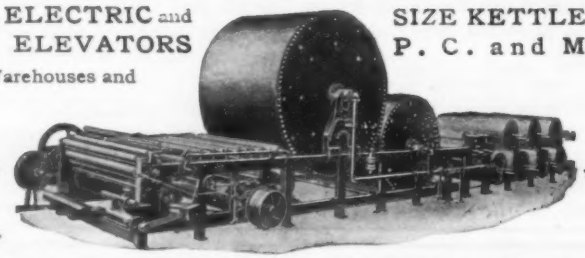
The COHOES SLASHER.

BELT-DRIVEN, ELECTRIC and HAND-POWER ELEVATORS

For Cotton Mills, Warehouses and Factories.

PULLEY BLOCKS.

OVERHEAD TRACKS.



SIZE KETTLES. REPAIRS for P. C. and M. MULES and EMPIRE LOOMS.

WATERWHEEL GOVERNORS.

The COHOES IRON FOUNDRY & MACHINE CO., Cohoes, N. Y.

Your Safety Depends on the Efficiency and Strength of Your Valve.
BETTER BE SAFE THAN SORRY.

Water-Relief Valve.

BUY CROSBY STEAM APPLIANCES WHICH ARE RELIABLE

WRITE FOR CATALOGUE.

Steam Engine Indicators
Recording Gages
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Brandon Rubber Pump Valves
Single Bell Chime Whistles
Feed Water Regulators
Lubricators
Pressure and Vacuum Gages
Water Gages, Gage Glass, Etc.

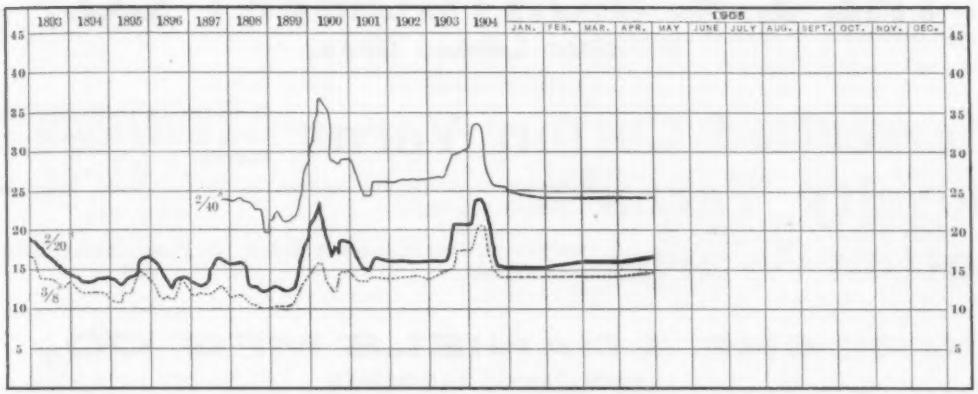
ENGINE-BOILER AND MILL SUPPLIES

Pop Safety Valve

CROSBY STEAM GAGE AND VALVE CO.

Stores, BOSTON, NEW YORK, CHICAGO, LONDON. Office and Works, BOSTON, MASS.

Yarn Department.



GRAPHIC CHART SHOWING RANGE OF PRICE OF COTTON YARN TO DATE.

Eastern Yarn Market.

Cotton yarn is in good demand and spinners are well sold ahead, some having the total production disposed of at satisfactory prices. The demand comes from both weavers and knitters and some buyers have found it difficult to provide for their requirements in time to cover contracts for goods. The tendency of prices is upward although no material advance has taken place during the last four weeks. The fact that the demand comes from every quarter warrants the belief that the improvement is here to stay. The steadiness of the cotton market is a boon to spinners as it enables them to fix prices and to cover contracts while still preserving a margin of profit, something they found impossible to do during the recent period of rapid fluctuations, high prices for the raw material and the demoralized state of the yarn and goods markets.

There is a very small quantity of yarn available for spot business and spinners find that any accumulation can be disposed of. There is no boom in progress and the activity is therefore all the more gratifying, founded as it is upon a healthy demand for goods from the consumer. Yarn mills are running to their full capacity, thus reducing the cost of manufacturing by turning out a large production. In this way the profit attained is substantiated by an advance in the selling price. We quote as follows:

Eastern Cops.

6's	15
8's	15
10's	15¼
14's	16¼
16's	16¾
18's	17¼
20's	17¾
22's	18¼
24's	18¾
26's	19¼
30's	20¼
34's	21¼
36's	21¾
40's	22¾

On cones, ¼c. more up to 14's; 1c. more from 15's to 22's; 1½c. from 23's to 35's, and 2c. above that.

Eastern Two-Ply Skeins, Carded Peeler.

12's	17½
14's	18
18's	19½
20's	20½
24's	22
26's	23
30's	24
36's	25
40's	26
45's	29
50's	33
55's	37
60's	41

Eastern Two-Ply Warps, Carded Peeler.

2/30's	24
2/36's	25
2/40's	26
2/45's	29
2/50's	33
2/60's	41

Egyptian Weaving Yarns.
Single Skeins Combed.

30's	31
36's	32
40's	35
45's	39
50's	42
55's	45
60's	48
70's	58

Two and Three Ply Skeins, Combed.

30's	33
36's	36
40's	39

THE J. R. MONTGOMERY CO.,

Windsor Locks, Conn.

MANUFACTURERS OF

Mercerized Cotton Yarns Gives the High Silk-Like Lustre in Knit Goods and Woven Fabrics.

Novelty Yarns Boucle, Bourette and Spirals, in Cotton, Wool, Worsted, Mohair and Silk.

Cotton Warps on Beams, Jack Spools and Tubes. In Fancy, Twist, Colors and Printed.

GREENE & DANIELS MFG. CO.,

COMBED, CARDED AND GASSED

Yarns, Threads, Twines and Chain Warps,

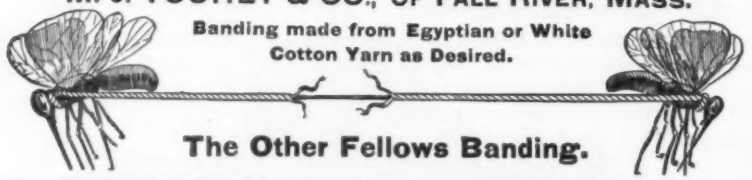
Colored and Bleached Yarns Furnished in any manner desired by the trade.

Pawtucket, R. I.

THESE MULES CANNOT BREAK THE BANDING —MADE BY—

M. J. TOOHEY & CO., OF FALL RIVER, MASS.

Banding made from Egyptian or White Cotton Yarn as Desired.



The Other Fellows Banding.

MONUMENT MILLS,

Manufacturers of

White, Colored, Fancy and Double Twist

COTTON WARPS

HOUSATONIC, MASS.

4s to 60s.

Dana Warp Mills

WESTBROOK, ... MAINE

White and Colored Warps 6s to 30s Single and Ply

Mule Cops From 30s to 50s from American & Egyptian Cotton

45's	42
50's	45
55's	48
60's	52
70's	60

Carpet Yarns.

60-yd. double reel filling	29
No. 2 60-yd. double reel filling	28½
1st quality ⅝	24
2d quality ⅝	23
60-yd. double reel filling skeins	10
(on cops)	11
120-yd. single reel cotton (on cops)	11
Wool ingrains, 42-yd. common	7
medium	8-8½
best	11½
extra best	15
light supers	18½
Super jute, 42 yard	7½
Super jute (light), 42 yard	7½-8
Velvet wool, spun, 135 yds., white	34
Gray	33

Philadelphia Yarn Market.

There has been an active demand for nearly all grades, with the market firm on weaving yarns and steady on knitting yarns. Some customers claim that they are not supplied with orders for a very long time ahead, but all mills seem to be fairly busy on spot business.

Spinners of 2-ply yarn are sold ahead for six weeks to two months, and we have heard of some contracts being placed for delivery through the fall, which would indicate that some buyers have decided yarns have reached bottom for this season.

Business is in much more settled condition on account of the moderate prices at which yarn is selling. There is no question that boom prices are bad for any commodity.

Woolen yarn spinners are practically shut down for want of orders, on account of the stiff advance they are compelled to ask. High priced wool the past season has undoubtedly increased the consumption of cotton along certain lines, and has helped cotton yarns considerably. Prices are generally steady, and have changed very little during the past month. Prices today are about as follows:

Southern frame spun cones:—

7's and Coarser	15
8's and 9's	15
10's	15
12's	15½
14's	16
16's	16½
18's	17
20's	17½
22's	18
24's	18½
26's	19
30's	20

PAULSON, LINKROUM & CO.
Successors to BUCKINGHAM, PAULSON & CO.
Commission Merchants
COTTON YARNS of all Descriptions
83 Leonard St., NEW YORK
302 Chestnut St., Phila. 210 Munroe St., Chicago, Ill.
Cash Advances, Cash Sales and Prompt Returns. Consignments and correspondence solicited.

JAMES E. MITCHELL CO., COMMISSION MERCHANTS.
Cotton Yarns
FOR ALL PURPOSES.
122-124 Chestnut Street, PHILADELPHIA, PA.
Brown Building, 185 Summer Street, BOSTON, MASS.

CATLIN & CO.,
Cotton Yarns
345 Broadway, NEW YORK.
67 Chauncy Street, BOSTON.
206 Chestnut Street, PHILADELPHIA.
605 Medinah Temple, CHICAGO.

Harding, Whitman & Co.,
Dry Goods Commission Merchants,
COTTON AND WORSTED YARNS.
BOSTON. NEW YORK. PHILA.
CHICAGO. BALTIMORE. ST. LOUIS.

A. D. SALKELD & BRO.,
With FRED'K VIETOR & ACHELIS,
YARNS.
66-72 LEONARD STREET, - NEW YORK.

Fred Sternberg & Co.
530 Broadway, - NEW YORK.
MERCERIZED TURKEY RED GASSED } COTTON YARNS.

E. D. LORIMER & CO.
COTTON YARNS } ALL NUMBERS
MERCERIZED YARNS } FOR ALL PURPOSES
346 BROADWAY, NEW YORK.

MOELLER & LITTAUER,
SILK, WORSTED, WOOLEN YARNS COTTON AND MOHAIR
Polished Threads and Tinsel. Artificial or Wood Silk. Mercerized, Turkey-Red, Fine Gassed Yarns.
109 GREENE ST., NEW YORK

CAPACITY, 35,000 Spindles.

ORSWELL MILLS

FITCHBURG, MASS.

COMBED **COTTON YARNS** CARDED

In Chains and Skeins, on Balls, Beams, Spools—Single or Twisted.

THE MALCOLM MILLS CO.,

MANUFACTURERS OF

FANCY YARNS and POLISHED THREADS.

Offices: 229 Chestnut St., Philadelphia.

Mills: Frankford, Pa.

KROUT & FITE MANUFACTURING CO.,

Manufacturers of

Silk, Cotton and Mercerized Narrow Fabrics

Spool Tapes a Specialty.

Telephone Connection. Office and Mill, Allegheny Ave. and Emerald St., PHILADELPIA.

WALCOTT & CAMPBELL SPINNING COMPANY

Fancy Hosiery Yarns

IN ALL COLORS

New York Mills, Oneida Co., New York.

A. G. THURSTON & SON,

MANUFACTURERS OF

Fluted Rolls, Pressers for Flyers

AND GENERAL MACHINERY

Specialties made of Renecking, Refluting, Filing and Honing of all kinds of Rolls. Flyers Repaired and Fitted with any desired style of Pressers, Spindles Straightened Restepped and Retopped.

Box 528. FALL RIVER, MASS.

Indian Orchard Company.

Cotton Warps and Yarns. In Gray and all Colors, Single or Two or more Ply and Cable Cord.

Novelty Yarns. in Various Patterns, Colors and Twists.

Carded and Colored Cotton. For Mixing with wool, Machined or in Roving.

Indian Orchard, Mass.

F. MORGAN, Pres. H. S. WRIGHT, Treas. W. C. GODFREY, Agt.

40's	25
50's	31
Southern high grade mule yarn:—	
Cones.	
10's	16
12's	16½
14's	17
16's	17¾
18's	18¼
20's and 22's	18¾-19½
24's	20
Southern frame yarn, lower grades:—	
6's and 8's	14½
10's	15
Eastern cones (high grade quality):—	
10's	16½
12's	17
14's	17½
16's	18¼
18's	18¾
20's and 22's	19¼-19¾
Skein yarn (mostly Southern):—	
4's to 8's soft	15
10's to 12's	15½
14's to 20's	15½-16½
22's	16½
14/2	16-16½
16/2	16½-17
20/2	17-17½
30/2	19½
40/2	24
16/3 slack	16½-17
12/3 slack	16¼-16½
8/3 carpet	15¼
8/3 slack	15-15½
9/4 slack	15-15½
Warps (Southern):—	
10's to 12's	15½
14's	16
16's	16½
20's to 22's	16½-17
26's	18
14/2	16½
16/2	16¾-17
20/2	17-17½
24/2	18
30/2	19½-20
40/2	23½-24
Mixed colored yarns (mock twist, half colors):—	
6's to 10's	16-16½
12's to 14's	17-17½
16's to 18's	19-19½

Silver and jaeger, 1½c. over white.

Mock Egyptian, 2c. advance over white.

Egyptian, 4c. to 5c. above best quality white.

Worsted Yarn.

The situation is a complicated one, but from the present outlook it is feared that spinners will soon be awakened to the true conditions of the market and the reason for a falling off in yarn orders explained. The facts are these: Weavers can get no advance for cloth and in order to meet the de-

O. K. SOAP CO.

MANUFACTURERS

FINE TEXTILE SOAPS,

SILKINE,

AND LISLE SILK FINISH

For Fast Black and Colors. Softness and lustre.

Write us to-day.

968 North Franklin Street, - PHILADELPHIA.

LINEN YARN IMPORTER.

HUGHES FAWCETT, 115 Franklin Street, NEW YORK.

Flax, Hemp and Jute Line and Tow Yarns,
For Weaving Purposes.
Linen Jacquard Harness Twines,
Fine Cotton Harness and Heddle Twines,
For Cotton, Silk, Woolen and Carpet Manufacturers.
Correspondence solicited. Samples promptly furnished.

Mercerized and Plain
Skein, Warps,
Cones, Cops,
Tubes

COTTON YARNS

426 and 428
Market St., Phila.
Theo. H. Strouse & Co.

Ballou Yarn Co.

PROVIDENCE, R. I.

Harness and Seine Twines and other Job
Gassing, Winding, etc. All Numbers.

GASSED YARN SPECIALTIES

American Cotton Yarn Exchange

COMBED and CARDED
COTTON YARNS

From Northern and Southern Mills.
American, Egyptian,
Peruvian and Sea Islands.

ARNOLD B. SANFORD, Pres. and Gen. Mgr.

OFFICES: 67 Chauncy St., Boston.
240 Chestnut St., Philadelphia.
108 Franklin St., N. Y., with James Talcott.

F. C. BARTON

MANUFACTURER OF LILY BRAND NARROW FABRICS
RIBBONS, TAPES, BINDINGS & NON ELASTIC WEBBINGS
54 FRANKLIN STREET, NEW YORK

Pocasset Worsted Company,

WORSTED YARNS

IN THE GRAY.

Mills at
Thornton, R. I.

Office
100 Boylston St., Boston, Mass.

CRANSTON WORSTED MILLS.

Worsted and Mohair Yarns—White or colors,
in skeins, on spools, cones, or shuttle bobbins.

Novelty Yarns—of Mohair and Worsted. We are the only manufacturers in the United States making these yarns from the raw material to finished product and making yarns only.

Genapped Yarns of all kinds. Doup Yarns. Harness Yarns. For Braids, etc.

DYERS OF YARN AND SLUBBING. BRISTOL, R. I.

French System. **B. F. BOYER CO.,** Bradford System.

MANUFACTURERS OF

WORSTED AND WOOLEN YARNS,

Office and Mill, Delaware and Cooper Streets. CAMDEN, N. J.

Woolen and Merino YARNS

Eaton Rapids Woolen Mills,

EATON RAPIDS, MICH.

EDDY & STREET,

Cotton, Woolen,

Yarns and Braids

Worsted, Spun Silk.

PROVIDENCE, R. I.

RICHARD CAMPION,

SELLING AGENT FOR

Bristol Worsted Mills,
Highland Worsted Mills,
Loridan Worsted Co.,

300 Chestnut St., PHILADELPHIA, PA.

The **WARREN SOAP** MFG. CO.

Products are Unequalled

FOR

Woolen, Linen, Cotton, Knitting and Silk Mills, Bleachers, Dyers and Calico Printers.

Established 1870 **BOSTON, MASS.** Incorporated 1890

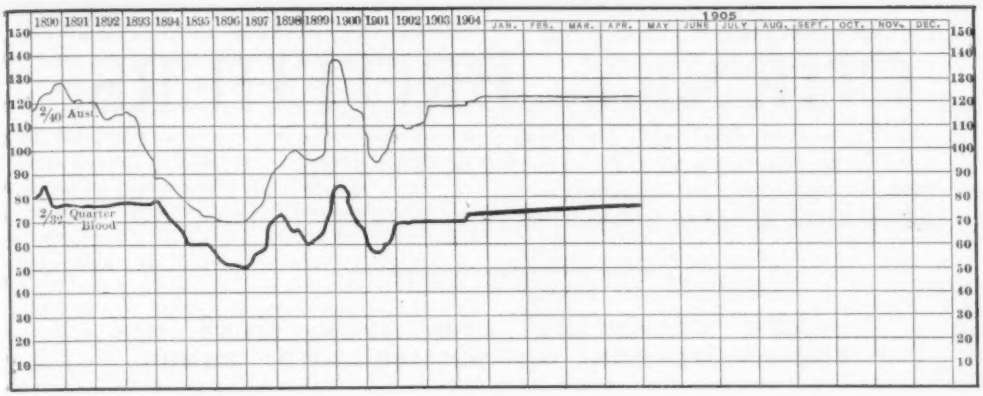


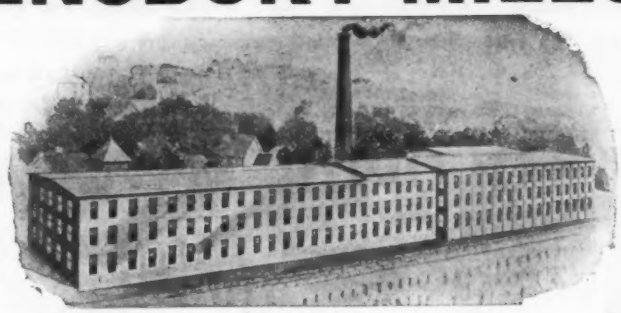
CHART SHOWING RANGES OF PRICE OF WORSTED YARNS.

mands of buyers are using as little worsted yarn as possible, and at the same time produce worsted effects. Every possible scheme has been worked to keep the cost of production down, and the weavers who have been able to produce cloth at old prices have been busy and are today working overtime. In Rhode Island and other parts of the country where cotton worsteds are made, the mills are all busy working night and day. Some of these mills are so busy that they can hardly spare the looms to get out the light weight samples, but with all this activity these mills are using very little worsted yarn, mostly cotton with a little worsted to take off the "cuss."

Then again the mills making mercerized cloth are busy and the mills using worsted filling and cotton warps are running well. This outlook does not encourage the worsted spinners and added to these conditions is the fact that spinners on certain grades of yarn will be forced to advance prices materially because of the high price of wool. What is the outcome of indifferent purchasers and a material advance in production? There can be but one answer: curtailed production, and that is what spinners have to look forward to after the old orders have been filled.

The cost of 1/4 and 3/8 blood yarn has already reached its highest point and a reaction is setting in. This class of yarn advanced 20 cents per pound in eight months, but the finer grades did not advance in this proportion. The result of this has been that the trend of the demand for future business for what worsted cloth is to be made in light weights has switched over to the finer grades

SILK NOILS AND SILK NOIL YARNS
In White and Colors.
A. T. SKERRY & CO., 47 Leonard Street, NEW YORK.
MOHAIR LOOPS, KNOTS AND FANCY YARNS FOR DRESS GOODS & CLOAKINGS.

QUEENSBURY MILLS WORCESTER MASS.
MOHAIR TOPS AND YARNS FOR WEAVING
LUSTRE YARNS FOR SERGE LININGS
ALPACA YARNS

SPINNERS OF MOHAIR YARNS FOR ZIBELINES
DRESS GOODS YARNS
KNITTING YARNS
WORSTED YARNS
MOHAIR

CHENEY BROTHERS,

Silk Manufacturers,

SOUTH MANCHESTER, CONNECTICUT.

TRAMS, ORGANZINE AND SPUN SILKS IN THE HANK, OR ON SPOOLS AND CONES.

SILKS FOR ELECTRICAL USES, INSULATION AND SPECIAL PURPOSES MADE TO ORDER.

KNITTING SILKS, RIBBONS AND PIECE GOODS FOR TRIMMING KNIT GOODS.

Pure Dye and Fast Colors Warranted.

WILLIAM RYLE & CO.,

Foreign and Domestic

Spun Silk Yarns and Noils.

Domestic Thrown Silk of every description. Fine Pure Dye Silks for the woolen trade a specialty. Importers of European and Asiatic Raw Silk.

54 Howard St., cor. Mercer St., NEW YORK.

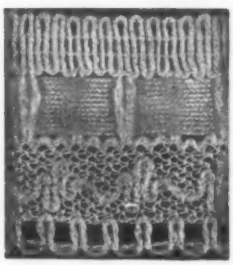
SAUQUOIT SILK MFG. CO.,

INSULATING AND BRAIDING SILKS.

ORGANZINE, TRAM & HOSIERY SILKS.

Fast Dye Organzines for Woolen Manufacturers a Specialty.

Mills: Bethlehem, Pa., Phila., Pa., Scranton, Pa. New York Representatives, Wm. Ryle & Co., 54 Howard St.—Phila. Office, 4015 Clarissa St., Nicetown.—Chicago Office, 210 Monroe St.—Boston Office, 78 Chauncy St.



GEORGE W. CHAPIN,

BRAIDS Cotton, Worsted, Mercerized, Cotton and Silk Twilled. **TAPES** Common, Twilled, Superfine and Plain 13 to 35s, white and colors on spools.

YARNS Cops, Skeins, Warps, Tubes and Cones. **THREADS** on Spools, Tubes, Cones, Unbleached, Bleached and Colors for Manufacturers' use.

CROCHET LACE EDGINGS Latest Styles in Pant Laces.

229 Church Street 231 . . PHILADELPHIA

of yarn from half blood quality up. The result of this change together with the high prices being paid for wool in the West will force spinners to ask more for this grade and will bring about a reaction for lower prices on the coarser grades. Weavers are refusing to place orders for these 1/4 blood grades because they say that in 60 days they will be able to buy for less. Spinners concede that this may be the case. As one spinner said of a certain weaver who refused to pay the highest advance: "It is probable if he holds out of the market he may get his yarn at about his price." No one expects, however, that prices will reach anywhere near their low level, but do expect a reaction which will bring prices down 7 to 10 cents from 92 cents on 2/36s 1/4 to 3/8 blood quality yarn.

It must not be imagined that there is no business for worsted yarns. Some weavers have secured reorders and have placed orders in fair amounts, and as contracts run out those weavers who are using single worsted yarn for filling and for twisting with a wool yarn thread, will order at the best prices which can be made, but the general trade for yarn will certainly be slow if present indications hold good during the balance of the year. Many of the spinners still have orders for which no spinning instructions have been given and some even have yarn spun up which they are trying to get weavers to take.

The present is one of between seasons and what the future will bring forth no one can tell. In the meantime weavers are going slow although every one knows that a light weight season calls for a larger use of worsted yarn than a heavy weight season. Some of the weavers are making the Eastern war responsible for the high price of worsted yarn. The French spinners have been fairly busy although some of them have been working on some very low contracts and when the new orders are placed the price of these yarns will be advanced to a considerable extent.

The dress goods manufacturers are busy on Panama cloth and the coming season will see the new mercerized fancy Panama effects. The combers are busy, but the prices have been largely advanced and the result is a curtailment of some business. The light weight orders will not open until July 4. Hosiery manufacturers are getting some good orders for hosiery. The season is not yet fully defined and the foregoing is merely the summary of what is observed. We quote as follows:

2/20s 1/4 Blood	75-65
2/36s 1/4 to 3/8 Blood	87½-90
2/40s Delaine	1.10
2/40s Australian	1.17

JENCKES SPINNING CO.,
Formerly E. JENCKES MFG. CO.
Carded and Combed Cotton Yarns for Weavers and Knitters.
Double and Twist Yarns for Woolen Trade.
PAWTUCKET, R. I.

WILLIAM B. CHARLES,
Cotton Yarns,
Cotton Cloth,
Silesia, Sateens,
For the Underwear Trade.
AMSTERDAM, N. Y.

GRANT YARN CO.,
COMBED AND CARDED COTTON.
YARNS 40's and above. AND
FITCHBURG, MASS. WARPS

FLOSSETTE MILLS
of the
New England Thread Co.
CENTRAL FALLS, - - R. I.
(DYERS and BLEACHERS) and MANUFACTURERS of
High Class Threads on Tubes, Spools and Cones and MERCERIZED YARNS for Knitting.
GLAZING OF YARNS
For the Shoe Lace. TAPE and WEBBING TRADE.

C. MOORE & CO.,
Manufacturers of
TWINES, THREADS AND YARNS,
Jacquard Harness Twines of all kind on hand and made to order.
S.W. Cor. Fifth and Market Sts., Phila.

Knitting and Weaving
YARNS.
Cones, Cops, Warps, Skeins,
Single, Double, Three-Ply, etc.
Peeler, Egyptian, Mixed Colors.
Large Assortment.
EDWARD S. HYDE,
226 CHESTNUT STREET,
Philadelphia, Pa.

What's the Use

of buying three or four times as much oil as is actually used for lubrication? For every drop of fluid oil which is **worn out** in reducing friction between bearing surfaces, at least three other drops either never reach the bearing in the first place, or else run through it into the goods and the floors.

The use of **NON-FLUID OILS** means free insurance against mill stains on goods, a substantial decrease in the oil bill, and — last but not least — no increase in the coal bill.

A postal will bring free testing samples by paid express.

NEW YORK & NEW JERSEY LUBRICANT CO.,
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JOSEPH M. ADAMS CO.
WOOLEN YARNS,
Carpet Backing and Rug Yarns a Specialty.
ARCOLA MILLS,
Main St., foot of Centre St., Manayunk, Philadelphia.

E. C. HARPER,
WORSTED and WOOLEN YARNS,
MERCERIZED COTTON,
395 BROADWAY, TEL. 1826 FRANKLIN NEW YORK.

YARNS Solis, Boston.
77
SUMMER STREET.
ANDREW J. SOLIS, Jr. & CO.

HOFFMAN, DeWITT & McDONOUGH,
Manufacturers of
Diamond Stay Bindings TRADE MARK
Tapes, Webbing and Bindings.
COTTMAN and G STS., PHILADELPHIA
Ryer's Station, P. & R. R. R.
Bell Telephone, 203 Cheltenham.

Wicasset Mills Co. | Patterson Manfg. Co.
Efrid Manfg. Co. | Tuscorora Cotton Mill.
HIGH GRADE HOSIERY YARN
White and Colors. All Numbers.
Sewing Twines on Cones and Tubes.
SPECIALTIES IN WEAVING YARN.
Black and white. Double and twist for woolen trade.
CANNON MILLS, 55 Leonard St New York.

ARTHUR FAWELL
Woolen and Worsted
YARN DYER
Nos. 110 and 112 Turner St., Phila.

Woolen Yarn.

Spinners are busy on yarn at present and on certain orders will continue employed well into the year. On some yarn for men's wear the heavy weight season is over by the end of June and the spinners of this class of yarn are looking for new business. The eiderdown knitters still continue to call for yarn as do the knitters using yarn for fleeced lined underwear. The hosiery knitters and certain other knitters will place no orders for yarn at present as they believe that next June prices will be more nearly normal. Just where they get these ideas in face of the present state of the wool market they do not state.

The knitters throughout the flatgoods district are running fairly well. One of the knitters on government work has started to run day and night, while some of the other mills are running 45 hours per week. All of them complain of the hand-to-mouth orders which are being received. The knitters, many of them, acknowledge that this season they have held their trade solely by the liberal use of cotton and say if the samples of the three past seasons were put together, the lowering of the grade by the use of cotton in the yarn would astonish the buyers themselves.

Some of the knitters state that buyers are holding off the market to such an extent that when they finally do order the season will be so late the knitters will be unable to produce them at any price. It is claimed that some knitters took orders believing that yarn and wool would be lower, but as this did not materialize the knitters will insist on higher prices the coming season. As the buyers will give no higher prices the knitters say they will shut their plant down rather than run at a loss. The mills which refused to lower the standard have secured but few orders the past season and all state that if the price of yarn and wool is maintained at advanced prices they will be obliged to change their mixes in many particulars.

A good deal of Australian lambs' wool is to be used the coming season as this wool carbonized is cheaper than Nevada wool scoured. As better yarn can be produced from the Australian wool it is easy to see that the lambs' wool will easily have the preference. Much Australian thread waste is being imported and it is certain that the high prices on domestic wool will cause a greater use of foreign stocks of all kinds. The season is early as yet and another month will determine the requirements of the trade.

The government has placed some large contracts for underwear and other orders will follow those already placed before the last of June. Spinners will have a slow period during the next three or four months especially those mills making yarn for men's wear. French flannel yarn and sales yarn generally will show fairly well as the season progresses. It appears that the spinners have a good season ahead of them which will develop as trade starts.

Rag and Shoddy Market.

The market for both rags and shoddy has been draggy and unsatisfactory, although the small collections of rags have kept the supply about equal to the demand and prevented any glut. It is esti-

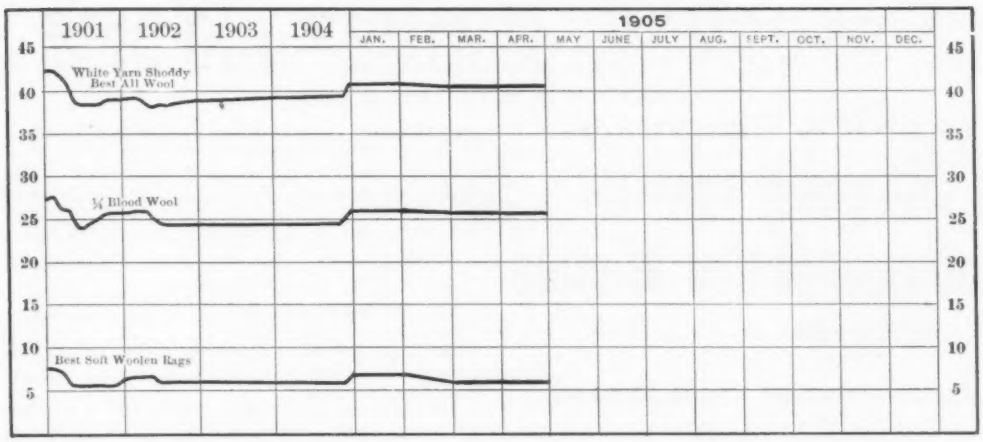


CHART SHOWING RANGE OF PRICES OF SHODDY, RAGS AND NOIL.

mated that the collection of rags is at least four weeks behind last year and doubtless a revival of the demand would stimulate collections so as to restore the normal supply. The shoddy market shows a like inanimation and spinners that have been disappointed in the volume of their season's business have restricted the purchases of raw material to actual needs, the prospect of a reduced consumption of shoddy owing to change of season, serving to depress the market still further. In spite of the small business, however, prices have been well maintained, this being due largely to the strength of the wool market. There is a good supply of cotton waste and buyers have no difficulty in filling their requirements, although there is a pronounced unwillingness on the part of sellers to make any concessions in price in order to move stock. The supply of woolen waste is small and desirable lots are quickly disposed of. We quote as follows:

SHODDIES AND EXTRACTS.

White yarn, best all wool	38-40
White knit, all wool, best, fine	28-32
White knit, No. 2	23-25
Light yarn, extra fine	25-28
New pure indigo blue	23-25

Merino.

Fine light, all wool, No. 1	24-25
Medium light, all wool, No. 1	16½-17½
Medium light, all wool, No. 2	14-16
Fine black, all wool	20-22
Fine dark, all wool, best grade	20-21
Medium dark, all wool, No. 1	13-15
Medium dark, all wool, No. 2	12-13
Red knit stock, strictly all wool	19-20
Red flannel, all wool	19-20
Dark blue for hosiery, strictly all wool, No. 1	17-20
Dark blue for hosiery, not all wool, No. 2	12-14

DELAINE EXTRACTS.

Light	19-22
Medium light	15-17

WOOLEN RAGS.

Regular gray	12-13
Black	14-15
Fancy colors	16-20
Fine merchant tailors, all colors	9-11
Choice light colors	13-15
Browns	12-13
Blacks	9½-10½
Fine blues, plain	9-11
Fine dark	10-11
Medium dark	7-8

Worsteds.

Blue	16-18
Black	18-20

Serges.

New black	15-16
New blue	14-15

Flannels.

New scarlet	18½-22
New blue	17-18
Cloakings	3-4

SOFTS AND KNIT STOCK.

Soft woolens, best	7½-8
Old white flannels	14-16
White flannels, No. 2	11-12
Old red flannels	9½-10
Light blue flannels	7½-9
Old blue flannels	6-7
Fine worsted, new black	26
New blue clip, best, fine	20-22
Dark mixed yarn, extra fine	22-24
All wool yarn, medium and coarse grades	15-20
Old plaids	5-7
White stockings	17-18
White hood stock	20-21
Clear hoods	9-10
Red stockings	9-10
Blue stockings	7-8
Fancy stockings, No. 1	7-9
Gray stockings	9-10
Black stockings	9-10
Knit stock comforters	6-7½
Red knit	9-10
Light gray knit	9-10
New light fancies	16-18
New fancies	12-14

Merinos.

Light, fine	13½-15
Light, coarse	7½-8
Fine, dark	12-13
Dark, No. 2	8-9
Coarse, dark	6-7
Blue	12-13

Garnetted Hosiery Waste

In Cotton, Cotton and Wool Mixes, and All Wool. White and Light Colors a Specialty.

SEND FOR MONTHLY PRICE LIST.

FRANK B. GRAVES, Cor. Church and Arch Sts., ALBANY, N. Y.

WILLIAM B. CHARLES,

Cotton and Cotton Wastes

Amsterdam, N. Y., U. S. A.

COTTON YARNS.

Contracts made with Cotton and Woolen Mills for Yearly Waste Production. Correspondence solicited. Shepperson's Code, 1878. Cable Address "Charles."

SHODDY

WM. H. H. SLACK & BRO.,
Springfield, Vt.

Carbonized Stock a Specialty. **FLOCKS**

M. B. SCHWAB, Pres. H. RAWITSER, Treas.
ED. GLUECK, Sec. and Gen. Mgr.

RIVERDALE WOOLEN CO., MANUFACTURERS OF

.. Shoddies ..

Of every description. Capacity 7,000,000 pounds per annum. Custom Carbonizing and Garnetting a Specialty.

New York Office. 140 DUANE STREET. **RIVERDALE, NORTHBRIDGE, MASS.**

C. M. BLAISDELL, Pres. and Treas. G. A. BLAISDELL, Vice Pres. and Secy.

Established 1860—Incorporated 1893.

THE S. BLAISDELL, JR., CO.,

COTTON, EGYPTIAN PERUVIAN

American Long Staple a Specialty. Shipments direct to mill from Egypt, Peru and all American Southern Points.

CHICOPEE, MASS.

Cotton Waste Purchased on Yearly Contract from Mills.

Has stood the test of years in Textile Mills

WARREN'S PULLEY COVER.

It allows belts to run slack without slipping. Saves power, belts and bearings. Any careful man can apply it. Is very economical and durable.

Sufficient for 40 sq. ft., $5; 125 sq. ft., $12.

If your supply house does not sell it, order direct.

The Warren Co., Mfrs., 192 Orleans Street, Chicago, Ill.

Blue—seamed	13-14
Black—unseamed	12-13
New black	18-20
Small	3¼-4
Bunting	6-8

FLOCKS.

Shear, fine white, all wool	9-11
Fine indigo blue, all wool	9-9½
Fine black, and blue, all wool	7-8
Fine dark, all wool	5-6
Gig, fine, all wool	3-4
No. 1 black, all wool cut	6-7
All wool, fancy, shear and gig	2½-3½

COTTON WASTE.

No. 1 Spinners	7-7½
No. 1 Machine	6-6½
No. 2 Machine	4¼-5¼
Machine Cop	6½-7
No. 1 Cop	6¾-7¼
No. 1 Card	7-7½
No. 2 Card	6½-6¾
No. 1 Oily Card	4¼-4¾
No. 2 Oily Card	3-3½
Peeler Combing	7½-7¾
Egyptian Combing	8
No. 1 Linters	4-4½
No. 2 Linters	3½-4
White Clips	6¼-6¾
Colored Clips	5-5½
No. 1 Picker	2-3

Dyestuffs and Chemicals.

Acids.

Acetic, 100 lbs.	2.60-4.05
Citric, domestic	34½-35½
Oxalic	5.00-5.10
Sulphuric, 60 deg., 100 lbs.	1.10-1.30
Muriatic, 18 deg.	1.50-1.60
Tartaric crystals	29-29½

Miscellaneous Chemicals.

Acetate of lime, gray, 100 lbs.	2.30-2.35
Alum, lump	1.75-1.80
ground	1.85-1.95
powdered	3.00-3.25
Aqua ammonia, 16 deg.	3¾-4
Ammoniac, sal., gray	5¾-6
Borax, bbls.	7¾-8
Brimstone, crude, foreign ton	21.00-21.25
Copperas	52½-65
Cream tartar, crystals	23½-23¾
Fuller's earth, lump, 100 lbs.	80-85
powdered	80-85
Glauber's salt	25-45
Potash, chlorate, crystals	8¼-8¾
powdered	8⅜-9
carbonate	4-4¾
Soda ash, carbonate, 48 per cent.	1.25-1.50
high test	1.00-1.25

Not Fully Saturated

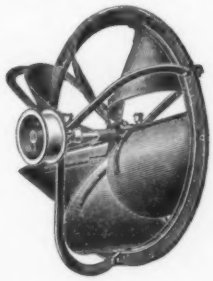
A manufacturer wrote us some time ago:

"The air that comes from my cloth dryer is not fully saturated with moisture, and consequently I think it has not done the work thoroughly. Can you help me get a larger production?"

Is he right or wrong about saturation? Have the temperature, volume of air, the way it is handled and a few other things anything to do with it?

We have been studying such questions relating to drying and ventilation for twenty years, and perhaps our experience may help you, as it did this man.

This is our Berry Wheel, the most effective agent for moving air, eliminating steam and other impurities in the atmosphere.



A HUN BERRY,
23 West First Street,
BOSTON.

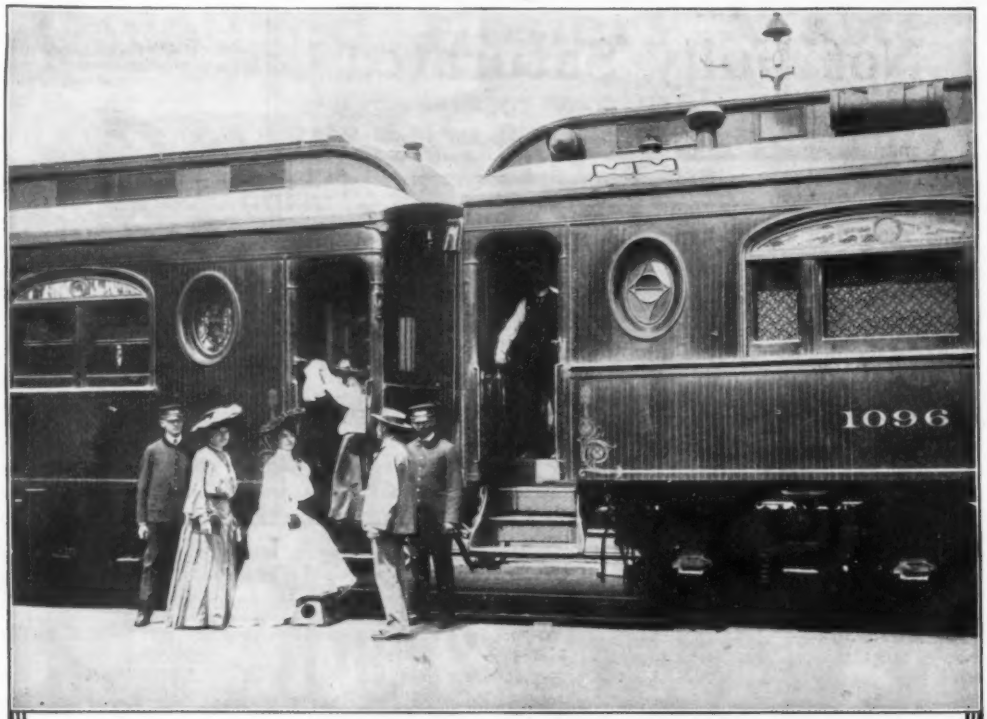
Soda, bicarbonate, English	3.50-6.00
American	1.30-1.70
Soda, caustic, domestic, 60 per cent.	1.85-1.90
Sal. English	85-90
Sal. American	60-70
Sulphate, alumina	¾-1¼
Vitriol, blue	5-5¼

Dyestuffs.

Acetate of soda	3½-3¾
Acid, picric, best crystals	23-28
tannic, commercial	35-37
Albumen, egg	45-65
blood	21-25
Alizarine, red	15½-16
Aniline oil	10⅛-10½
salt crystals	8¾-9
Antimony salt, 65 per cent.	10¼-11
Bichloride of tin, 50 per cent.	9¼-9¾
60 per cent.	12¼-12½
Bichromate of potash, American	8½-8¾
Bichromate of soda	6½-6¾
Bisulphate of soda	1-1½
Cutch, mat	4½-6
boxes	5-8
Dextrine, imported	6½-7½
corn	2.57-3
Divi-divi ton	35.00-40.00
Flavine	23-40
Fustic, stick, ton	18-20
young root	31.00-35.00
Gambier	4¼-4¾
Hypo. of soda, Am. bbls. cwt.	1.50-1.60
Indigo, Bengal, low grade	52½-55
medium	60-65
high grade	75-85
Kurpah's, medium to good	47½-60
Gautemala	35-70
Manila	43-45
Madras	42-45
J. (Synthetic)	18-20
Indigotine	95-1.80
Logwood, stick, ton	15.00-19.00
roots	14.00-16.00
Madder, Dutch	7-10
Muriate of tin, 36 degrees	9-9¼
52 degrees	15-15¼
Nitrate of iron, commercial	1¼-1½
Nutgalls, blue Aleppo	24-25
Persian berries	7-8
Phosphate of soda	1.90-2¼
Prussiate of potash, yellow	13½-13¾
Quercitron, ton	18.00-20.00
Starch, corn, pearl, bbls.	1.77
corn, pearl, bags	1.62
potato	3½-4
rice	6½-7½
wheat	5-6
Stannate of soda	12-20
Sumac, Sicily, No. 1, ton	42.00-47.00
Sicily, No. 2, ton	38.00-40.00
Tapioca flour	1.95-2¼
Tin crystals	22-23½
Turmeric, Bengal	3¼-3½
Zinc dust	5½-6

A. J. WEEKS,
926 E. Market Street, Akron, Ohio.
MANUFACTURER OF
Chemical Stoneware, Jars, Jugs, etc,
For Mills, Dyers, Bleachers, etc., from 10 to 200 Gallons capacity.
Write for Illustrated Circulars and Prices.

You Save Enough Insurance to Pay for the Equipment.
So it costs you NOTHING to have the AMERICAN WATCHMAN'S CLOCK. Fully approved by all insurance companies. We equip factories with Fire Alarms, Signals, etc., also Employee's Time Recorders, and Telephone Systems. Electric Time System consists of Master Regulator in office with secondary electric clocks throughout the mill, insuring accurate time. Send for particulars.
Pettes & Randall Co., 150 Nassau St., New York



"Crossing the Continent"

This phrase has come to mean a very common, every-day performance—people travel to and fro between the East and California as unconcernedly as you please.

Rock Island transcontinental Tourist Sleepers (so comfortable and economical that they always gratify the traveler) leave the East and the West on their long, interesting trips several times a day. In fact, they are operated over two routes and *on Rock Island rails via both routes* for a good share of the distance.

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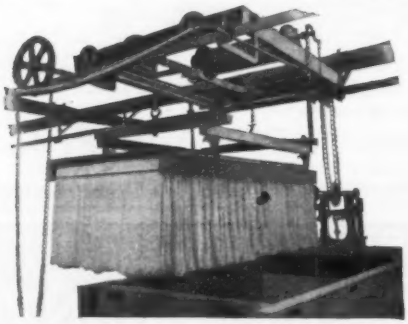
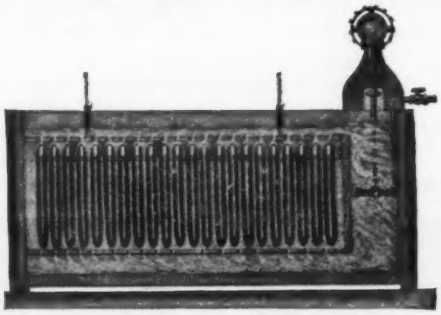
Patented Nov. 6, 1900. April 9, 1901. Nov. 29, 1904.

A PERFECT SKEIN DYEING MACHINE



This illustration shows our Compressed Air Hoisting Carriage, with 300-pound Yarn Machine suspended.



Longitudinal Sectional View, showing the circulation of dye-liquor through the yarn when in operation.

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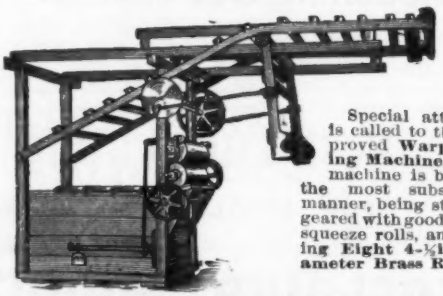

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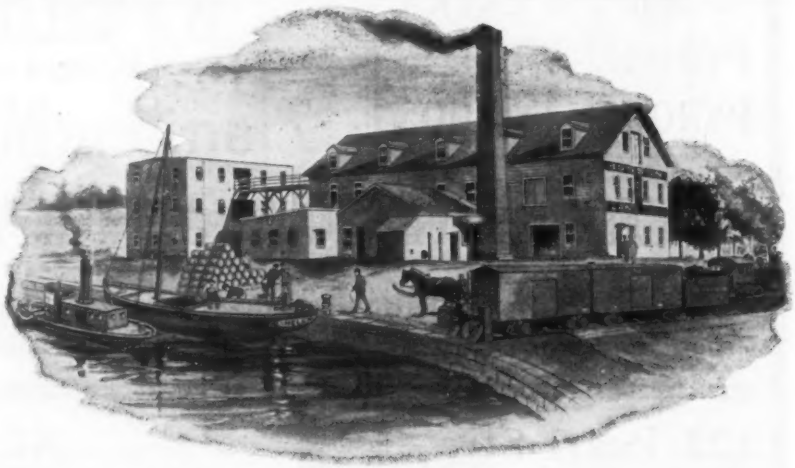

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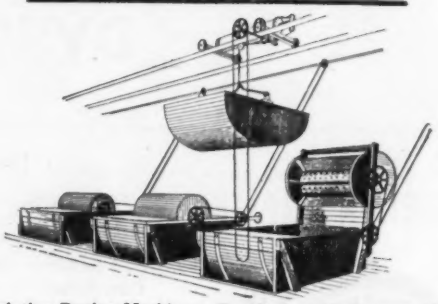

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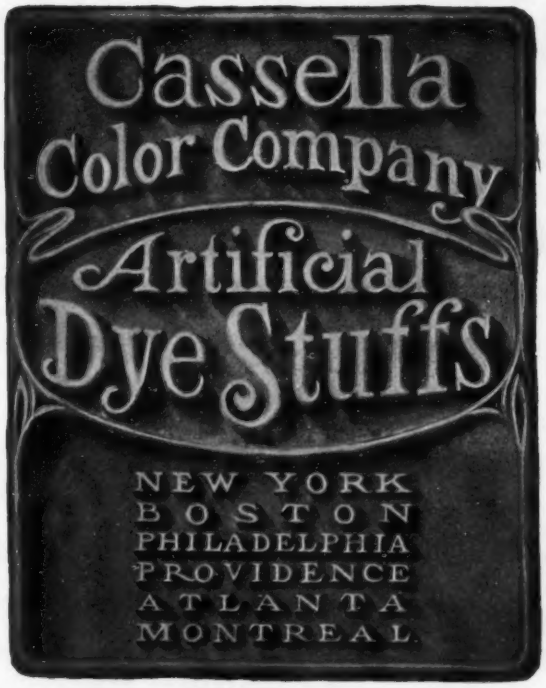
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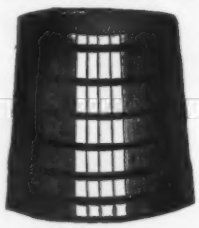

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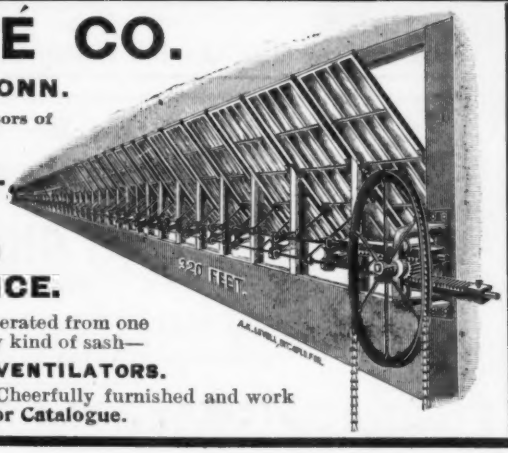

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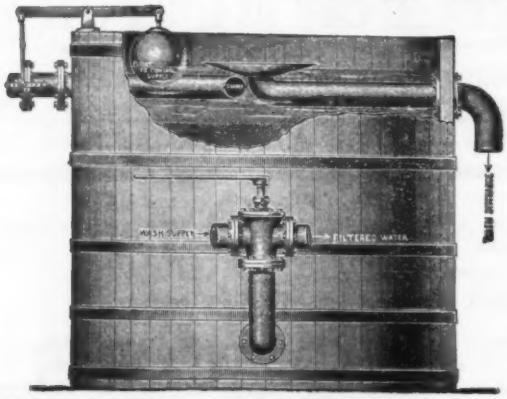

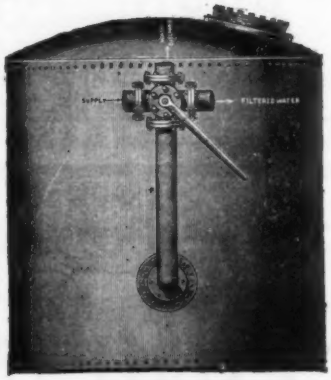

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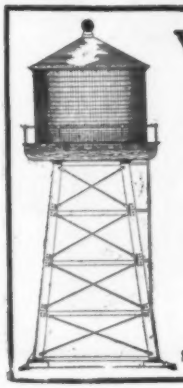

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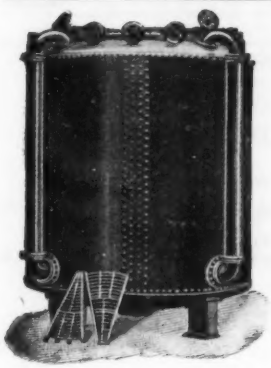

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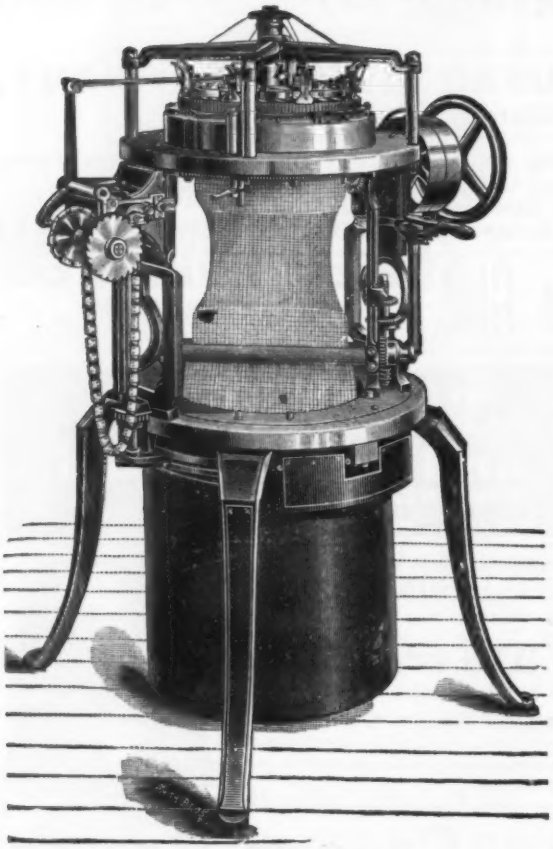

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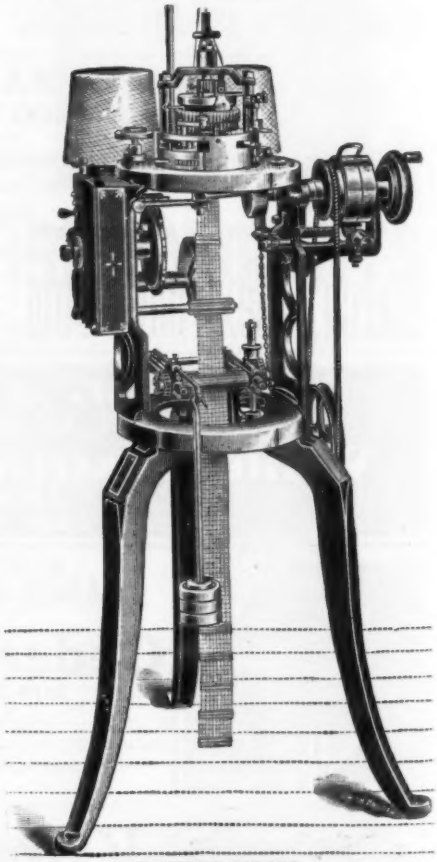

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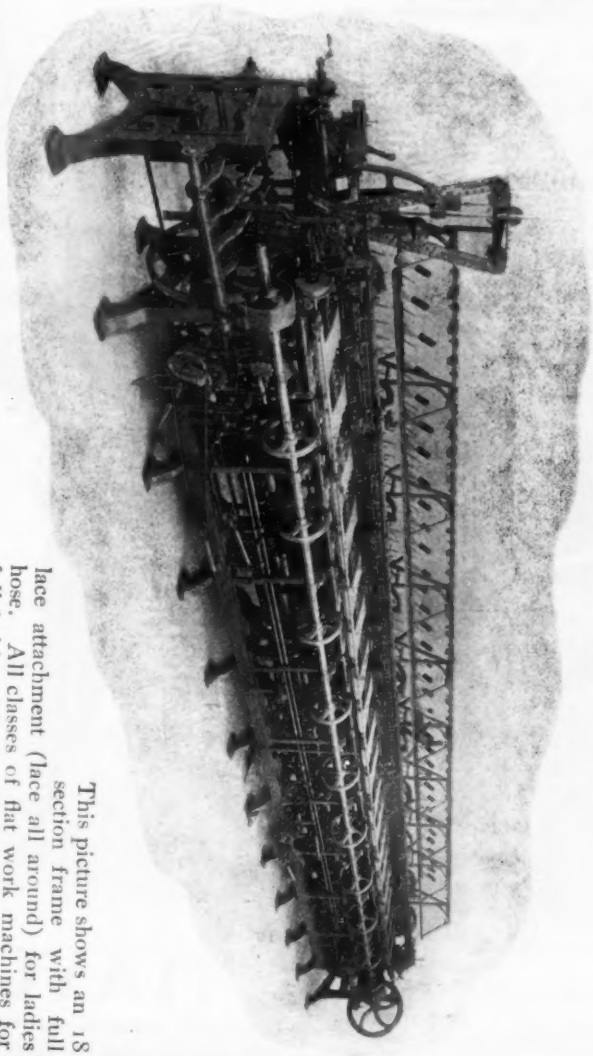


This picture shows an 18 section frame with full lace attachment (lace all around) for ladies hose. All classes of flat work machines for full fashioned hosiery in all gauges, from 14-32 needles to one inch, from 12 to 24 sections, also machines for full fashioned shirts and drawers in all gauges from 6 to 10 sections, with narrowing and widening. Split sole, plating, 2, 3 or 4 colors horizontal striping attachment, full lace and vertical striping machines.

OTTO WALTHER,

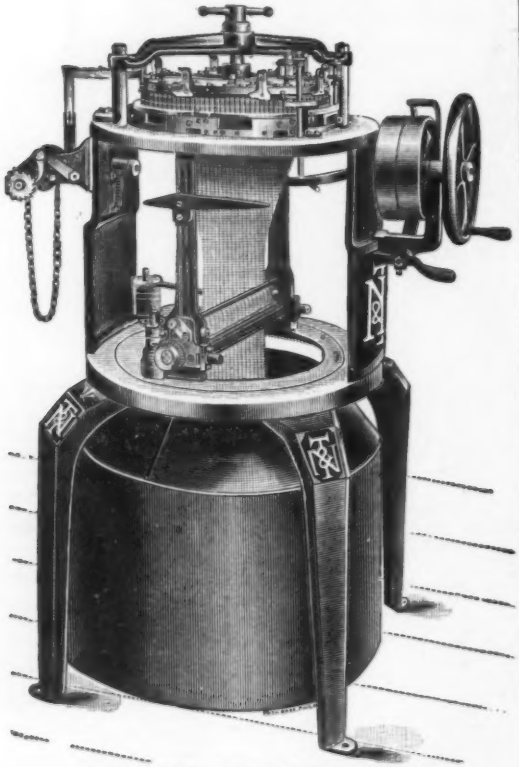
591 Bourse Building, Philadelphia, Pa.

NYE & TREDICK CO.

Circular Rib Knitting MACHINERY

For making Ribbed Underwear, Combination Suits, Sweaters, Cuffs, Shirt Borders, Hosiery, etc. : ; :

Correct Construction. Excellence and Durability.



LATEST IMPROVEMENTS
QUALITY OF FABRICS AND PRODUCTION
UNEXCELLED

NYE & TREDICK CO.
606 Arch St., PHILADELPHIA, PA.

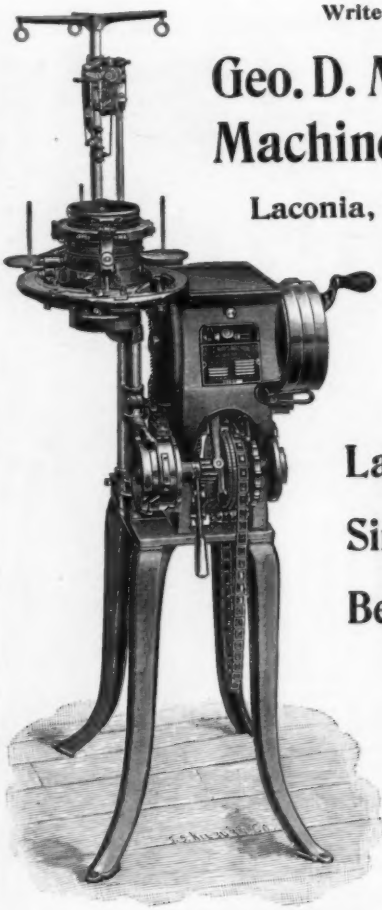
If You Want

Largest Production For Least Money

Write

Geo. D. Mayo Machine Co.,

Laconia, N. H.



Latest
Simplest
Best

MAYO'S

New Full Automatic Knitter.

PHILADELPHIA OFFICE,
KNICKERBOCKER BLDG., COR. SIXTH AND ARCH STS.,
B. M. DENNEY, REPRESENTATIVE.

Friedberger Mfg. Co.

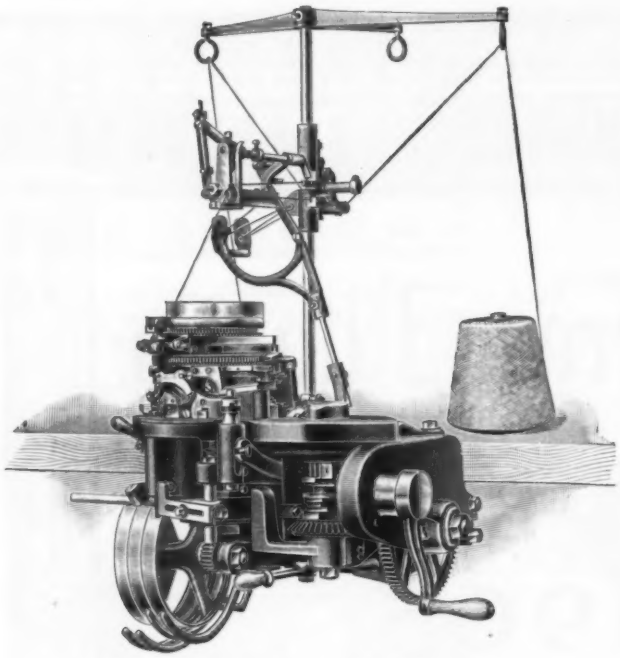
Spring Line 1905 Complete

NOW

Being Shown by Salesmen and at Mills.

GERMANTOWN, PHILADELPHIA

P. O. Address, Logan Station.



Also furnished on base.

CALL AND SEE

The

"Invincible"

"THE KNITTER THAT KNITS."

At our new office and show room

SCHENCK BUILDING,
6th and Arch Sts.,
PHILADEPHIA, PA.

E. Jenckes Mfg. Co.

Main Office and Factory.
PAWTUCKET, R. I.

R. M. OATES, Southern Representative,
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The Merrow

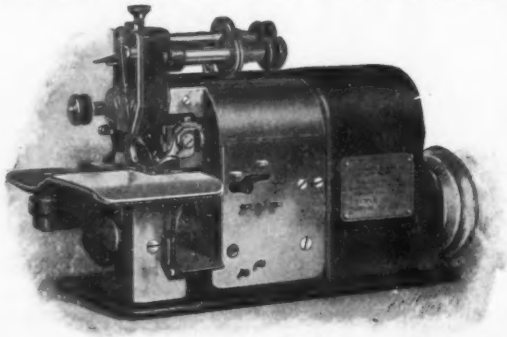
High Speed Overseaming,
Overedging and
Scallop Stitch Machines

are LIGHT RUNNING, FAST and DURABLE.

OUR NEW STYLE 60 MACHINE for Trimming and Overseaming in one Operation produces the strongest, best Seam and does it with the greatest economy.

STYLE 35 B SHELL MACHINE

For Necks and Fronts of Rib Goods, produces the most showy, substantial finish.



USE STYLE 17 or 22 for Bed Blankets and STYLE 18 for Horse Blankets.

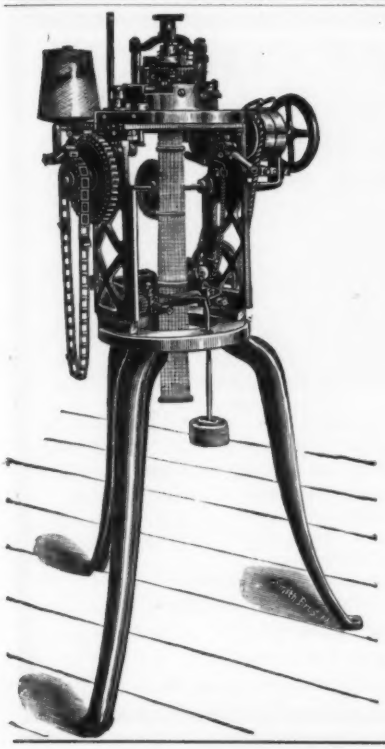
Send for Catalogue and Samples.

THE MERROW MACHINE CO.

Knickerbocker Building,
Sixth & Arch Sts., Phila.

HARTFORD, CONN.

346 Broadway, New York



H. Brinton & Co.

213-215 Race Street, Philadelphia, Pa.

BUILDERS OF

Knitting Machinery

For HOSIERY and UNDERWEAR.

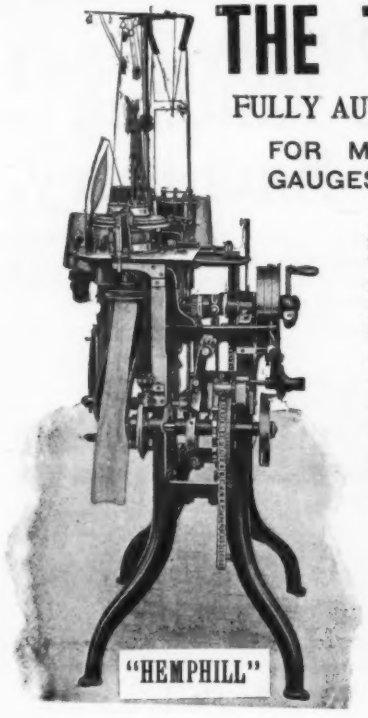
Complete Estimates Furnished. Send for Particulars.

The cut shows our **Improved Automatic Ribber** with Welt and Slack Course for Half Hose, Tops and Ribbed Legs.

THE TWO LEADERS

FULLY AUTOMATIC HOSIERY KNITTERS

FOR MAKING ALL KINDS AND GAUGES OF SEAMLESS HOSIERY



"HEMPHILL"

One with **GEARS**, the other with **CHAIN** for pattern mechanism, to meet the various tastes of different manufacturers.

Both used and approved by leading hosiery manufacturers.

Both contain all the well-known essentials demanded of first-class knitting machines.

With these two machines we can supply all manufacturers' possible wants in the best possible manner.

Write us for further particulars and prices.

We also make all kinds of **LATCH NEEDLES.** Many leading manufacturers use our needles and say they are the best on the market. Send us a trial order.

MAYO

Knitting - Machine and Needle Co.,

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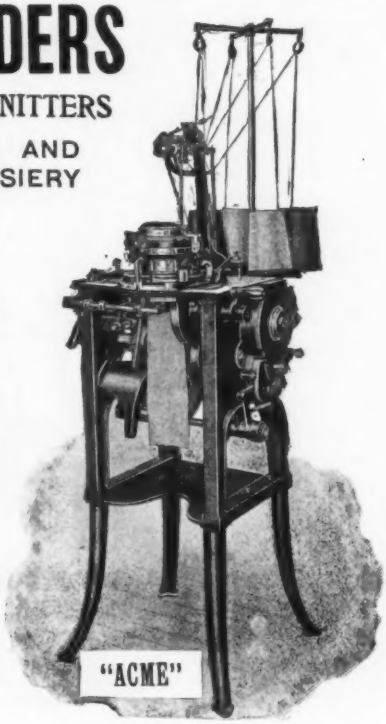
Philadelphia Office. Knickerbocker Bldg., Cor. 6th & Arch Sts.



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835 Arch Street, - - - Philadelphia, Penn.

KNITTING MACHINERY

OF ALL KINDS. NEW AND SECOND HAND.

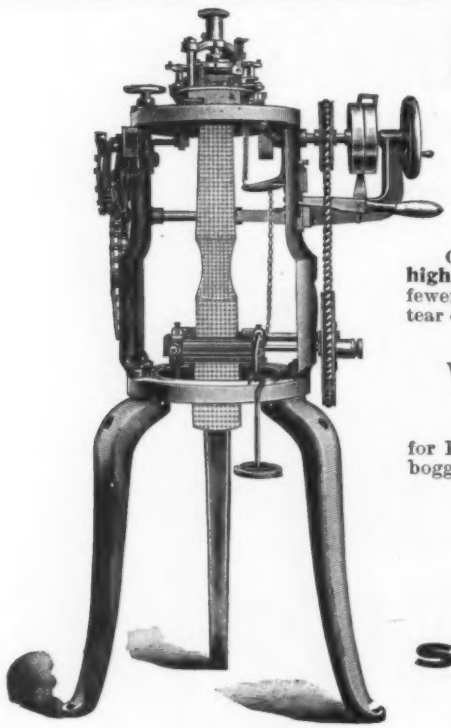
A RARE OPPORTUNITY TO BUY.

1 Complete plant; 500 per day of ladies', gents' and misses' hose. Modern mchy.
28 Beattie & Hepworth & Abel loopers.
10 Hosiery presses (lever).
1 14 plate Crawford press, 32 x 58.
4 Lamb and Grosser sweater machines.
150 Ribbed underwear machines, various sizes.
60 Brinton & Co. ¼ aut. knitters, sizes.
24 Standard B machines.
56 Union Special machines, various styles.
1 Rotary fire pump.
10 h. p. electric motor.
100 Mayo machines. Various sizes.
100 Brooks welters.
4 Fleecing machines.
98 Brinton & Co. and other make hosiery ribbers.
1 40 Spindle, Easton and Burnham spooler.
40 Ribbed shirt machine cylinders and dials, all sizes, cuts and makes.
1 36-inch engine driven extractor.
1 10 plate Crawford press, 32 x 43.
2 40 Sp. Payne cop winders.
2 Lindsay & Hyde winders.
2 Grosser Jacquard machines for gloves.
4 Cyclone dryers
2 Typewriters.
5 Band folding and cutting machines.
5 30-inch ventilating fans.
1 Small Water Motor.
1 Small Steam Pump.
1 Small Belt Pump.
15 Rudolph Seaming Machines.
3 Cornely Embroidery Machines.

WRITE FOR COMPLETE LIST.

APPRAISEMENTS A SPECIALTY.

We are always in the market to buy good second-hand Knitting and Finishing Machinery.



High Speed Rib Knitting Machinery.

Our latest model machinery has been designed to run at **very high speed**, giving large production. This is accomplished with fewer seconds, less breakage of needles, less jar and wear and tear on machines than has been customary at lower speeds.

We also make Special

STRIPING AND DESIGNING MACHINES

for Fancy Golf Stockings, Bathing Suits, Sweaters, Toques, Toboggan Caps, Skirts, etc.

Our Machinery gives large production at low cost and enables manufacturers to meet the market always and make a profit.

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Tam O'Shanter Decision.

The United States Court of Appeals in Philadelphia, which is the Court of last resort, on Feb. 13th, 1905, decided in our favor, the suit against Morris Starrels of Philadelphia for infringement of our patent No. 669,011 dated Feb. 26th, 1901, for Flat Knit Caps or Tam O'Shanters and Art of making the same. The claims of our patent for making brushed knit tams, thus sustained are broad, and as a number of other manufacturers are also infringing, we have been compelled for our own protection to enter suits against them.

Our counsel will push these suits vigorously and are instructed to move for injunctions immediately to stop further infringements of our claims, which we have sustained after tedious and costly litigation.

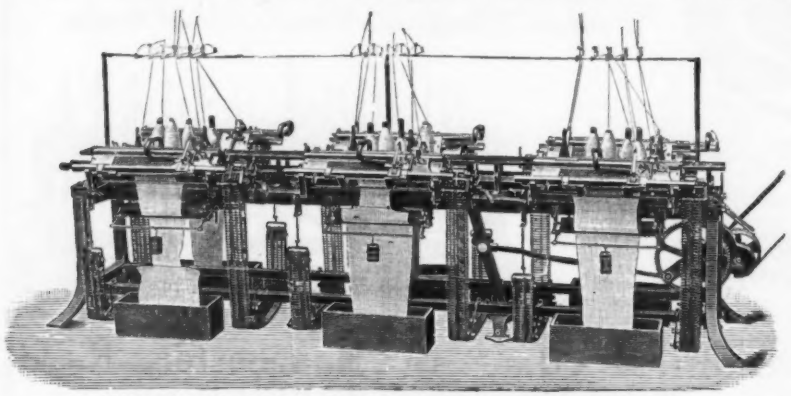
All persons are, therefore, warned against the manufacture of these goods by methods which infringe the claims under our patent under penalty of immediate legal proceedings.

QUAKER CITY KNITTING CO., Philadelphia.

The Grosser Knitting Machine Co.

Wool Exchange Room 400 — **MAX NYDEGGER** — **260 West Broadway New York**

The *"Grosser"* full automatic Power Machines are always the ***cheapest,*** because ***they are the best.*** Special constructions for any kind of flat knit goods. Large Production. Machines easy to operate. The Grosser Jacquard and Shaker Machines have the best success in the market. Ask for descriptive Catalogue, Samples and particulars. ***Power Machines*** to ***be seen in Operation.*** Demonstration Rooms, Repair Shop. Largest and best assorted stock in ***Hand Knitting*** Machines, parts, needles and supplies. Promptest delivery. Special Machines for fancy gloves to be operated by girls.



"GROSSER" FULL AUTOMATIC WIDENING MACHINE, 6 SECTIONS.

Ask for prices and samples.

EXCELSIOR KNITTING MACHINE MFG. CO.

BUILDERS OF

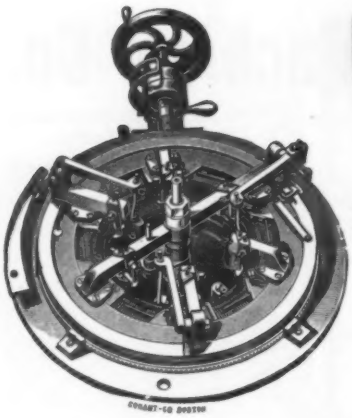
Full Automatic Knitters

WITH OR WITHOUT

Transferring Device

ALL SIZES AND GAUGES, 2 1-4 INCH TO 4 INCH

MEADOW AND WASHINGTON STREETS ALLENTOWN, PA.

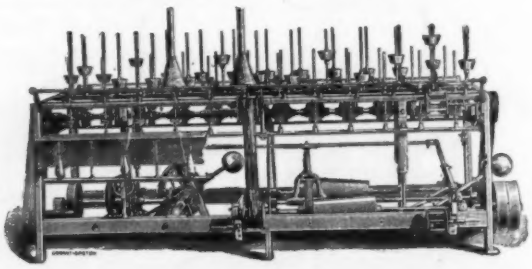


CIRCULAR KNITTING MACHINES

Either plain or full automatic, with stop motions complete. 4 to 24 feeds for

RIBBED UNDERWEAR

Automatic Racking and Striping Machines for Sweaters, Cardigans, Collarettes, Cuffs and Anklets.



ALSO BUILDERS OF THE WELL-KNOWN

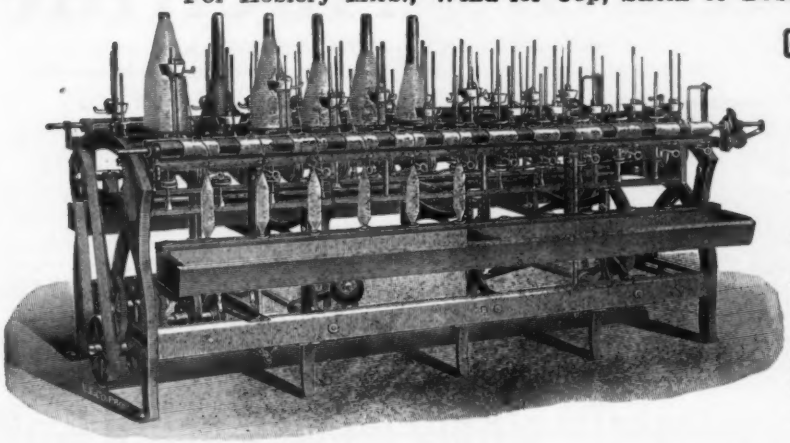
ABEL WINDERS, SEAMERS and LOOPERS.

LEIGHTON MACHINE CO., - Manchester, N. H.

GEO. W. PAYNE, Prest. J. MILTON PAYNE, Treas. CLINTON F. PAYNE, Sec'y.

OVER 1,650 PAYNE WINDERS IN USE

For Hosiery Mfrs., Wind for Cop, Skein or Bobbin.



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[Est. 1865. Inc. 1903.]

Builders of the

Improved

Upright Spoolers,

To Spool from Cop, Skein or Bobbin.

Doubling Spoolers, for doubling 2, 3, or more ends into one,

Upright Quillers, Quill from Cop, Skein or Bobbin.

Ring Dresser, Spooler and Reel Spindles, Cop Skewers, Warp, Spool, Spooler, Guides, Bolsters and Stops Made and Repaired at Short Notice.

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MAKER OF

For Ladies', Gents', and Children's Goods.

LATEST STYLES.

BEST WORKMANSHIP.

Drying Form Boards

OF EVERY VARIETY.

WORKS: CHEMNITZ, SAXONY ESTABLISHED 1851.

G. HILSCHER

FULL-FASHIONED HOSIERY AND UNDERWEAR MACHINE BUILDER

SOLE AGENT FOR UNITED STATES AND CANADA

EDWARD W. KOCH, 319 Bourse Building, Philadelphia, Pa.

"Awarded Gold Medal at World's Fair, Paris, 1900,

for highest improvement in the mechanism of manufacturing full-fashioned hosiery, solidity and perfect workmanship in construction and the superiority of fabric produced."

SPECIALTIES:

COTTON-HILSCHER HIGH SPEED SYSTEM, 65 courses per minute.

COTTON SYSTEM, for horizontal stripes up to 6 Colors, Scotch plaids and vertical stripes, lace through the narrowing, split, etc., etc.

COTTON SYSTEM, wedge heel; this machine manufactures entire full fashioned ladies' hose or half hose and dispenses with the foot machine.

COTTON SYSTEM, newest construction. The new machine knits the entire hose or half hose complete down to the toe, it makes French heels and French feet.

RIB MACHINES: Cotton system, with and without narrowing.

RIB MACHINES: Hilscher system, high construction.

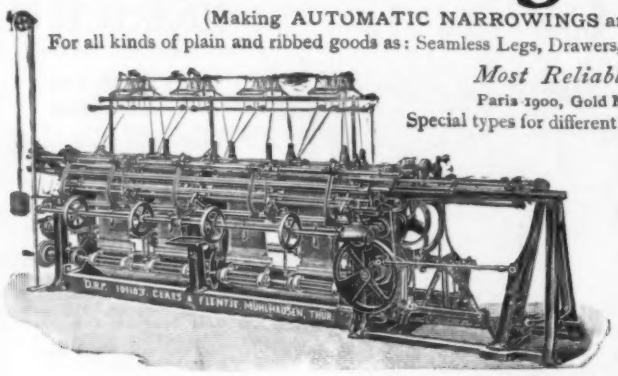
Machines can be seen in operation at above address.

FULL AUTOMATIC

Fashioning-Machine

(Making AUTOMATIC NARROWINGS and WIDENINGS)

For all kinds of plain and ribbed goods as: Seamless Legs, Drawers, Combinations, Sleeves, Suits. Blouses, etc.



Most Reliable and Productive Machine!

Paris 1900, Gold Medal! Paris 1900, Gold Medal!

Special types for different articles. Number of heads to order.

Automatic Sweater Machine

With Independent Heads, Latest Improvements. Recognized as "The Best."

Ask for samples and particulars, state guage and size you need.

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MÜHLHAUSEN, THÜR, GERMANY.

Representatives: Ainslie Knitting Machine Co., Ainslie and Humboldt Sts., Brooklyn, N. Y., where all kinds of hand and power machines can be seen working.

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60½ and Media Streets, . . . PHILADELPHIA.

GAS ENGINES for city or country
BRUSHING MACHINERY
KNITTING MACHINERY

} EFFICIENT DURABLE LOW IN PRICE

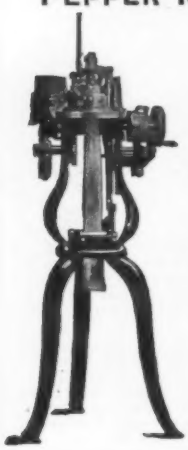
CRANE MFG. CO.

SUCCESSORS TO

PEPPER MACHINE WORKS

Lakeport, N. H.

Manufacturers of



Knitting Machinery,

INCLUDING

Pepper's Flat Ribbed Cuff Machines,

Automatic Welt and Loose Course Machines for Stock Tops. New Circular Stripers with Welt, Loose Course and Striping (Automatic), for Short Cuffs, Sock Tops, Hose Legs, Wristers, etc.

Golf and Bicycle Stocking Machines,

ALL KINDS OF

CIRCULAR RIBBED MACHINES

For Men's Underwear, Ladies' and Misses' Hose Legs and Leggins. Correspondence Solicited.

CRANE MFG. CO. Lakeport, N. H.

Spring Needle Circular

KNITTING MACHINE.

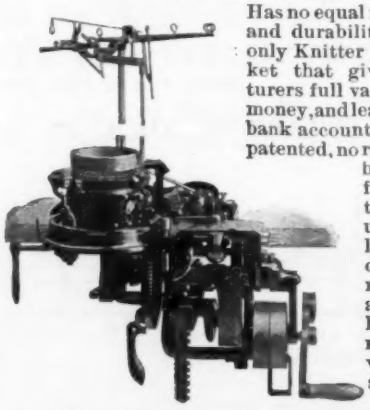
For Hosiery, Shirts, Drawers, Jersey Cloth and Stockinet.

A Specialty of Hardened Bladed Burr Wheels with Self-Oiling Brackets.

The New Improved

Boss 15/16 Automatic

KNITTER



Has no equal for simplicity and durability. It is the only Knitter on the market that gives manufacturers full value for their money, and leaves a swelled bank account. It is fully patented, no royalty to pay; built in sizes from 2½" up to 6"; from 42 up to 220 needles in 3¾" machine. Knits men's, ladies' and children's hose, plain or ribbed. Runs with one single belt. Automatic tension in heel and toe. Send for prices and particulars to

THE BOSS KNITTING MACHINE WORKS,

Cor. Elm and Reed Sts., Reading, Pa.

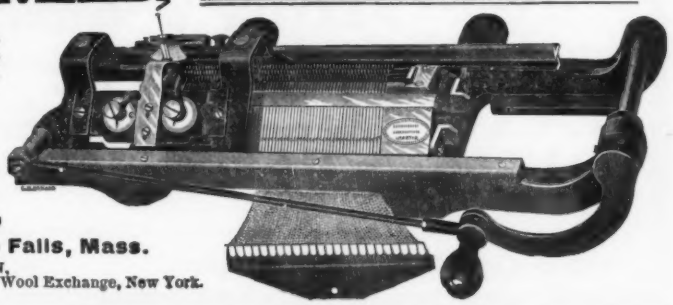
HARDENED STEEL CYLINDERS A SPECIALTY.

The LAMB, LEADER OF KNITTERS.

Original and Still the Best.

Most widely used; being operated in every civilized country in the world. For description, prices, etc., see catalogue.

CIRCULAR MACHINES,
RIB TOP and
SEAMING MACHINES.



LAMB KNITTING MACHINE COMPANY,

P. O. Box 5888, Chicopee Falls, Mass.

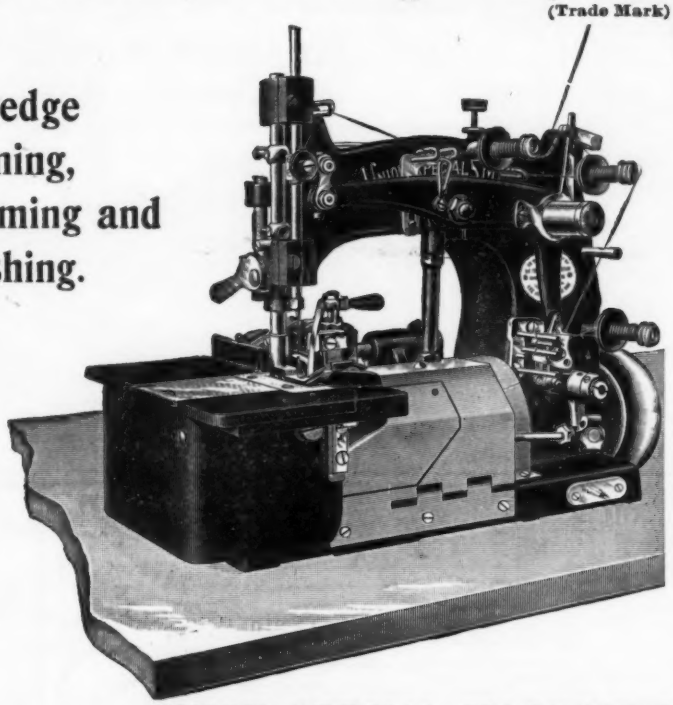
J. E. WOODHEAD, 100 22d St., Chicago.
L. D. SANBORN, Room 505 Wool Exchange, New York.

High Speed and Most Durable Mechanism are the Essential Elements of Machines to Produce Sewed Articles. We have these Elements in the

New Union Special Single "Interlock" Machine

(Trade Mark)

For Overedge Seaming, Hemming and Finishing.



High Speed Class 15400.

Two or Three Thread Stitch.

Simplicity.

Durability.

UNION SPECIAL MACHINE CO.

75 E. Kinzie Street, Chicago.
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PAXTON & O'NEILL'S

3-4 AUTOMATIC KNITTER

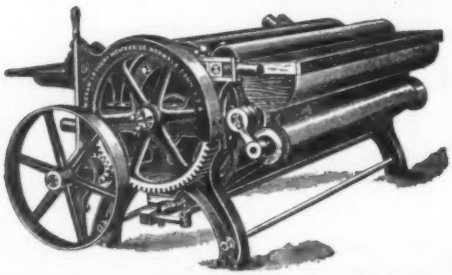
FOR ALL KINDS AND GUAGES OF SEAMLESS HOSIERY.

Has the preference wherever used over 7-8 and full automatics. Because it makes as much or more goods and better goods. Costs less for repairs. Gives less trouble to fixers. Range on Half Hose, from the coarsest to 260 needle.

Exclusive rights to BROWN'S ATTACHMENTS FOR LACE EFFECT.

Cylinders and Dials for all size Machines. **127 Bread Street, Phila.**

AUTOMATIC IRONING and PRESSING MACHINE for KNIT GOODS.



This machine irons and presses ribbed and flat underwear, giving a fine, smooth finish and most attractive appearance to the goods, not to be obtained in any other way. It does not break buttons. Inexpensive and easy to operate, and has large capacity. Knitting mills using them are greatly pleased with results. This method of finishing is sure to come into universal use. Send for further particulars to

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Patent Single-Stitch

LOOPING MACHINE.

Needle working from the inside, avoiding the breaking of needles and points and picking up the metal.

Single and Double Stitch, or Both Combined.

JOHN W. HEPWORTH & CO.,
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Drying Forms.

BOARDS FOR FAST BLACK DYERS.

HOSIERY FINISHING BOARDS.

BEST WORK. PROMPT SERVICE. PRICES ALWAYS RIGHT.

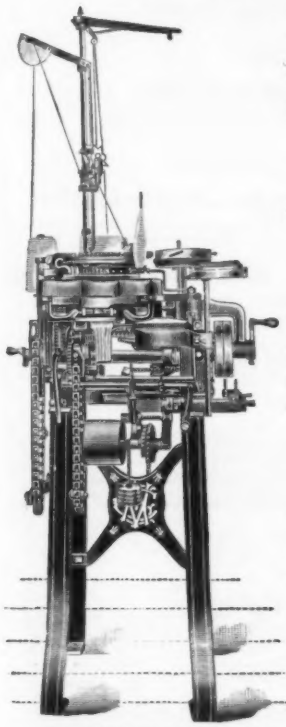
JOS T. PEARSON 1815-21 TAYLOR ST. KENSINGTON PHILA

Hosiery Boards.

We Know How

TO BUILD HOSIERY MACHINERY

That's Why There Are More Standards



in use than any other make.

Have you seen the new Standard F?

It will produce from 30% to 50% more goods than any other machine on the market.

Hosiery manufacturers are invited to inspect it in our show rooms.

ARE YOU INTERESTED?

STANDARD MACHINE CO.,
508 Ludlow Street,
Philadelphia.

A. McMICHAEL,

Machinist,

Repairs to Hosiery and Underwear Machines, Cylinders and Dials of every description.

FINE MACHINE WORK.

22 Armat Street, near Main, Germantown,

PHILADELPHIA, PA

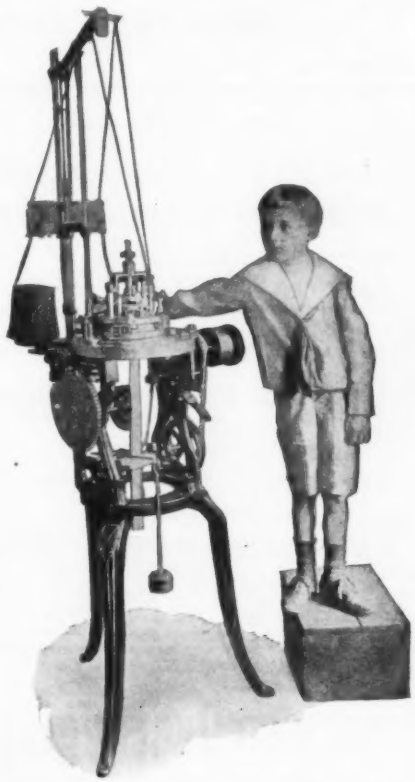
We HARDEN all CYLINDERS and DIALS large and small.

A FAIR PROPOSITION

If wanting to purchase Ribbers, you can try a

RUTH RIBBER and STOP MOTION

before buying to satisfy yourself that they are all right. Our STOP MOTION is a decided improvement over all others. No cutting of yarn, easy to thread. Stops from any imperfection in yarn. The movement of one lever releases brake and corrects yarn guide, when stop is caused by knot you have but one hook to thread. Very positive in its action.



Our RIBBER is high speed, durable, simple and easy to operate, with largest production; single or double feed, plain or fancy stitch for half hose and misses goods. Large loose-course, good round welt, double knee, sleeves or cuffs. Knits wool or cotton yarn, fine or course guage. Hardened cylinders and dials for any make of machine. Best Workmanship. All products guaranteed. Can attach STOP MOTION to any style machine.

Write to-day for price lists.

RUTH MACHINE CO., York, Pa.

Address Box "N." G. W. Ruth, Manager.

SMALL RIB MACHINES
CROCHET MACHINES

NATIONAL

SHELL STITCH
MACHINES

Spring Beard Needle Machine
For SEAMLESS HOSIERY, Plain and Novelties

Automatic Rib Machine
For RIBBED UNDERWEAR. All Styles and Gauges

Over Seam Machine "Champion Improved"
For Welting Seamless Hosiery. Covering Raw Edges of Rib Fabrics.

NATIONAL AUTOMATIC KNITTER CO.
SEND FOR FULL PARTICULARS
724-726-728 Cherry St., Philadelphia

Do you wish to make knit goods as perfect as the French or German, and as rapidly as the American?

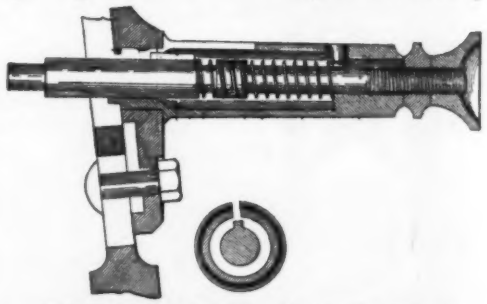
Do you want to plait?

Do you want to knit worsted or silk?

?

WRITE TO
TOMPKINS BROS. CO.,
TROY, N. Y., U. S. A.

ROBERT W. CORMLY & CO.
TROY, N. Y.
—BUILDERS OF—
Spring Needle Knitting Machinery

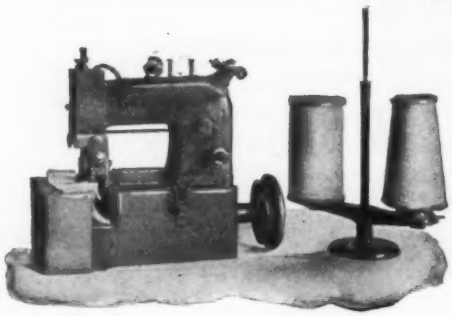


PATENT BURR STAND TUBE
The cheapest and best on the market with more and simpler adjustment than any other make.

Julius Kayser, Pres. Simon Banner, Treas.

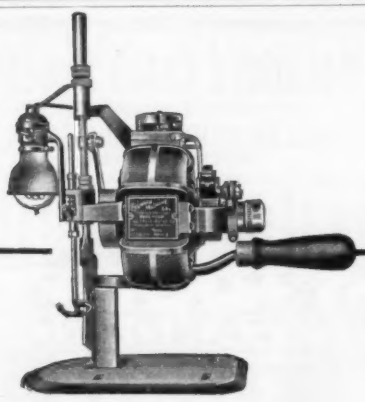
American Overedging and Seaming Machine Co.

Manufacturers of
Overedging
AND
Seaming Machines



For All Kinds of
Cut and Full Fashioned Underwear and Sweaters

FACTORY, 543 EAST 116th STREET - - - - - - - NEW YORK CITY



If you are

cutting your production by the old hand way, or by any of the newer methods and your results are not satisfactory, try the **Eastman Cloth Cutting Machine**, it's the surest and only way of getting perfect results.

Invest three hundred and fifty dollars on a trial; if the results don't prove satisfactory you'll not be the loser.

THE EASTMAN MACHINE COMPANY

41 and 43 East Eagle St., BUFFALO, N. Y.

OFFICES:
New York, 107 Walker St. Chicago, 245 Jackson Boulevard.
Baltimore, 305 W. Fayette St.

THE PACKAGE INFLUENCES
the sale of goods.

PAPER BOXES

covered with our

"Glassfinish" Papers

help to

HOLD TRADE

Specify our papers in ordering Boxes—they cost no more.
We also have papers to duplicate those on imported boxes.

Chas. Beck Paper Co.,
Philadelphia, Pa.

The CRAWFORD

HOLLOW STEAM

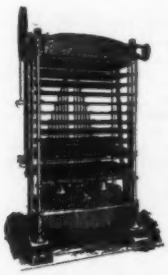


PLATE PRESS

For Knit or Woolen Goods.

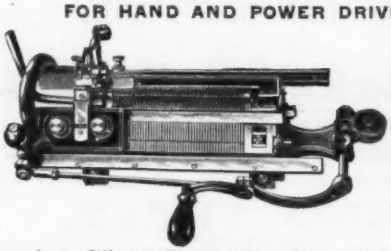
The most reliable machine of the kind on the market.

PRESS PAPERS and FENDERS.

SPENCE & RIDEOUT,
Successors to
J. J. CRAWFORD & SON,
NASHUA, N. H.
Established 1868.

Best Knitting Machines

IMPROVED CONSTRUCTION
FOR HAND AND POWER DRIVING.



High Speed, Excellent Workmanship.

Auto. Rib-top, Fancy-stitch Jacquard Machines.
Everywhere in work. **80,000** Machines sold.

CLAES & FLENTJE,
Mühlhausen, Thür, Germany.

Agents for the East: Ainslie Knitting Machine Co., Ainslie and Humboldt Sts., Brooklyn, N. Y.
Agents for the West: Logan Knitting Factory, Logan, Utah.

DAVENPORT PEARL BUTTON C .

Davenport, Iowa.
Manufacturers of

PEARL BUTTONS.

New York Office, - - - - - 377 Broadway

BUTTONS

ALL KINDS OF BUTTONS
Fine Specialties for Fancy Knitting Trade.

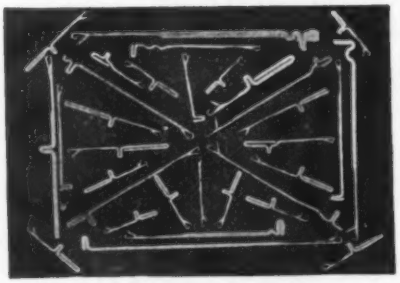
WRITE US FOR UP TO DATE SAMPLES.

INTERNATIONAL BUTTON CO., Rochester, N. Y.

NEW YORK OFFICE, 826-828 BROADWAY.

TRY OUR "SUPERIOR" OR SUNKEN RIVET-HEAD NEEDLES

They will save you money.



Dodge Needle Co., Manchester, N. H.

WM. COREY CO.,
Manufacturers of Knitting Machine
Latch Needles,
MANCHESTER, N. H.

EXCELSIOR NEEDLES.
The best Hosiery Needles in the market.
Manufactured by
WARDWELL NEEDLE CO., Lakeport, N. H.

W.M. BREEDON'S SON,
MANUFACTURERS OF
Spring Knitting Needles
AND BURR BLADES OF ALL KINDS.
AMSTERDAM, - N. Y.

ORION TREAT,
MANUFACTURER OF
Screw Riveted Balmoral and Double Rib
NEEDLES
(Patented May 6, 1890.)
All Work Guaranteed. MANCHESTER GREEN, CONN.

L. T. IVES CO.
Manufacturers of all kinds of
SPRING KNITTING NEEDLES
NEW BRUNSWICK, N. J.

Standard Latch Needles
MANUFACTURED BY
EXCELSIOR NEEDLE CO.,
TORRINGTON, CONN.
The Largest Manufacturers of Machine Needles in the World.

STANDARD
TRADE MARK.

Longer Wear. Better Work.
Less Mending. Fewer Seconds.
Have you tried our
Patent Milled Rivet.
Agents
C. B. Barker & Co., Ltd., 42 W. 15th St., New York.
Manufacturers' Supplies Co., 418 Arch St., Phila.
C. Shawl, 33 2d St., San Francisco, Cal.
J. C. Strittmatter, 2a Calle de San Francisco No. 9, City of Mexico, Mexico.

Manufacturers' Supplies Co.
418 ARCH STREET, PHILA.
Needles and Supplies for Knitting Mills.
Agents for EXCELSIOR NEEDLE CO., and NATIONAL NEEDLE CO.

PAGE NEEDLE CO.,
MANUFACTURERS OF
LATCH NEEDLES
of all kinds. Warranted in every respect.
CHICOPEE FALLS, MASS.
Agents: J. E. Woodhead, 100 Twenty-second Street, Chicago, Ill. Durbrow & Hearne Mfg. Co., 12 Wooster Street, New York. James Taylor, 835 Arch Street, Philadelphia, Pa.

KNIT FABRICS CUT TO LENGTH.
Our Knit Fabric Cutter
will cut from the roll, knit fabric into any length from 10″ to 40″ at the rate of 100 pieces a minute. The lengths are accurate, the waste is a minimum, the labor unskilled.
We also make a Slitter
for cutting these goods into narrow strips and rewinding same into rolls.
SAMUEL M. LANGSTON,
Manufacturer of Paper Box Machinery. Ninth above Market Sts., Camden, N. J.

CHARLES COOPER,

BENNINGTON, VERMONT.

MANUFACTURER OF

Knitting Machinery

Flat and Circular Rib, both Spring and Latch Needle, Plain Circular Machines, Lead or Trick Cylinder. **Spring Needle Cylinder Rib-Top Machines**, for making Cuffs, Drawer Bottoms and Shirt Borders. **Spring and Latch Knitting Needles, Burr Wheels, Burr Blades, Sinkers, Jacks, etc.**

COLLARETTE ATTACHMENT

European Representatives,
MOSES MELLOR & SONS, Ltd.
Nottingham, England.

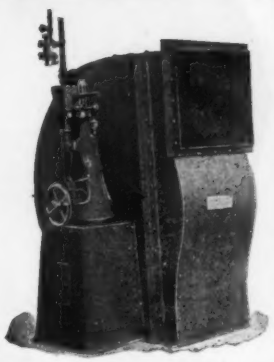
C. J. SIBBALD, General Representative, 757 River St., Troy, N. Y.

LACINGS FOR OVERSHIRTS and UNDERWEAR.

Tipped and Tasseled.

Hepner & Horwitz, 30 Howard St., N. Y.

THE
DAVIDSON FAN
MECHANICAL HEATING, VENTILATING AND DRYING, MECHANICAL DRAFT FANS

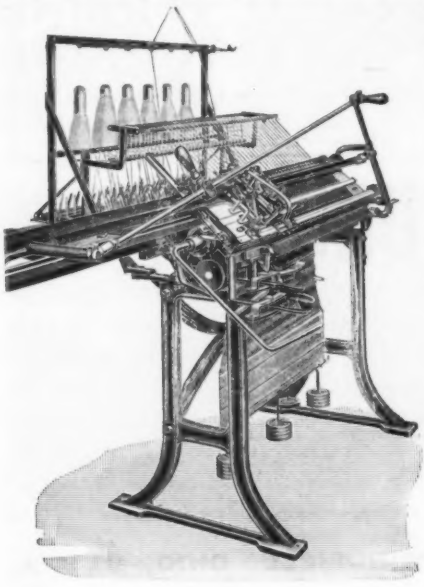


MASSACHUSETTS FAN COMPANY, WALTHAM, MASS.

CELEBRATED BRAND PYRAMID TRADE MARK LACINGS

For Underwear, Overshirts and Sweaters,

JOHN CATHCART & CO.,
115 Franklin Street, NEW YORK.



Walter & Co., Limited.

Mühlhausen i/Thür, Germany.

SPECIAL MANUFACTURERS
— OF —

KNITTING AND WINDING MACHINES

for hand and power driving, of best quality and perfect construction.

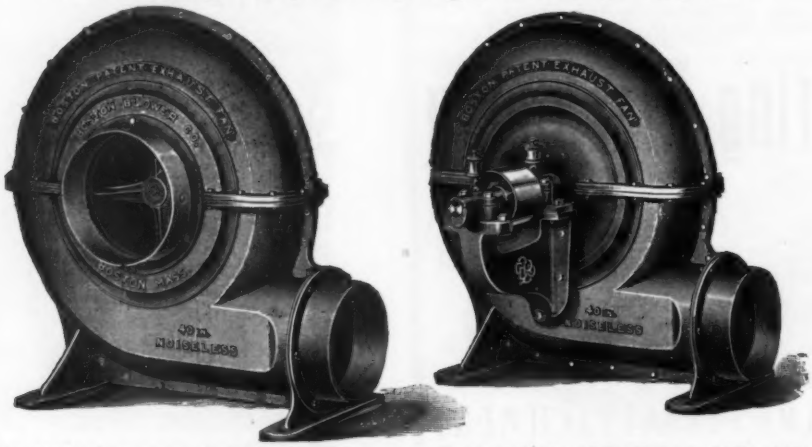
SPECIALTY: JACQUARD MACHINES

for hand and power driving for manufacturing of sweaters and every possible fancy article of that nature.

PRICE LISTS AND SAMPLE ON APPLICATION.

Boston Wool Exhausters, with Removable Tops.

As used in Connection with Pneumatic Conveyor System for Handling Wool, Cotton, Rags, Excelsior, Jute, etc.

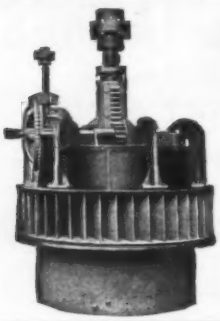


Inlet Side of Right-hand Wool Exhauster. **Pulley Side of Left-hand Wool Exhauster.**

This machine is similar in design to the regular Boston Patent Exhaust Fan, but is fitted with a special wheel for handling fibrous materials, and the top is removable.

This latter feature is especially desirable when handling wet or greasy materials or in handling anything, in fact, which would leave a deposit on the inside of fan, as the entire top may readily be removed for inspection or cleaning without disconnecting either pipe or belt connections.

BOSTON BLOWER CO., Main Office and Works: **Business and Glenwood Sts., HYDE PARK, MASS.**



Risdon-Alcott Turbine Co.

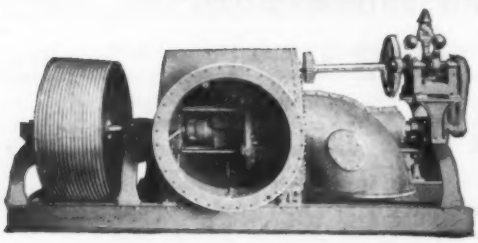
MOUNT HOLLY, NEW JERSEY, U. S. A.

RISDON CELEBRATED TURBINE
ALCOTT HIGH DUTY TURBINE

On Horizontal or Vertical Shafts.

These Turbines are recognized as the most effective water wheels made. Your inquiries should come direct to us for this class of machinery.

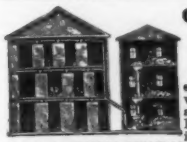
SAMSON TURBINE



The higher the SPEED of a GENERATOR the LOWER its COST. We can SAVE YOU MONEY if you will use the SAMSON to drive the generator because there is not another turbine built that will attain as quick a SPEED when operating under the same conditions.

Write Department A-5 for Catalogue.

The James Leffel & Co., **SPRINGFIELD, OHIO, U. S. A.**



CHARLES H. SCHNITZLER,
Patentee and Sole Manufacturer of
THE PNEUMATIC CONVEYOR

For the handling of wool and cotton stock, rags, excelsior, jute and all kinds of fibrous material, wet or dry. Also spool elevators, steam heating and ventilating, and mill work generally. Blower and fan work a specialty. This conveyor is patented. Beware of infringement.

SATISFACTION GUARANTEED. Patented Oct. 15, 1889.

215 NORTH SECOND ST., - PHILADELPHIA, PA.

G. Bickelhaupt Skylight Works

Sole Manufacturers of
G. B. TRADE MARK SPECIALTIES.

SELF-LOCKING SCUTTLE OPENER.

Skylight Lift and Skylights.

Established 1869. Send for pamphlets.

243-245 N. 47th Street, - NEW YORK.

Water Wheel Governors

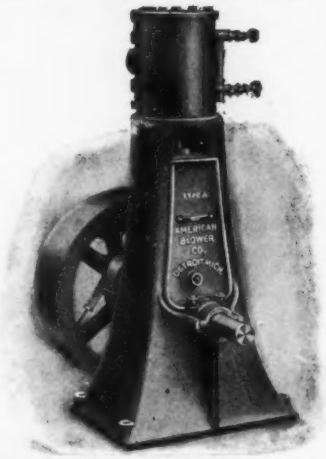
For TEXTILE MILLS

We Guarantee Satisfaction.

Replogle Governor Works

Write for Catalogue T. **AKRON, OHIO.**

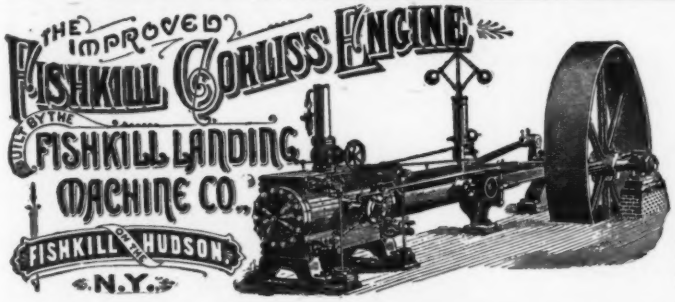
SELF-OILING ENGINE



Especially adapted for continuous operation at high speeds—every working part runs in oil—no contact between metals—fully enclosed.

FANS AND BLOWERS FOR ALL PURPOSES.

AMERICAN BLOWER CO., Detroit, Mich.



Most Efficient and Economical Power in the world For Textile Mills.

It has NO EQUAL for Close Regulation and Noiseless Operation. Send for Catalogue.

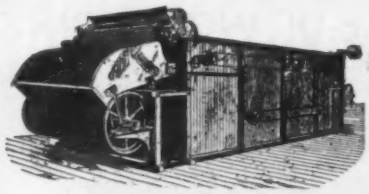
PAIR McCORMICK TURBINES

4,000 H.P., 72 ft. head, arranged to drive generator and a single turbine to drive exciter. Five settings built for the Hudson River Water Power Company's Spier Falls plant and 14 pairs 51 inch for their plant at Mechanicsville, N, Y.

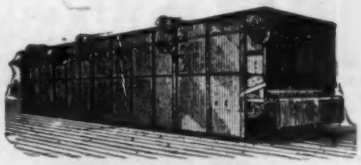
Write for Catalogue if contemplating purchase of turbines.

S. MORGAN SMITH CO.
YORK, PA.
Boston Office, 176 Federal Street.

MAY 16 1905



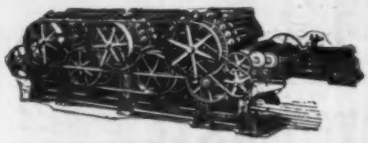
Automatic Cotton Stock Dryer.



Automatic Yarn Dryer.

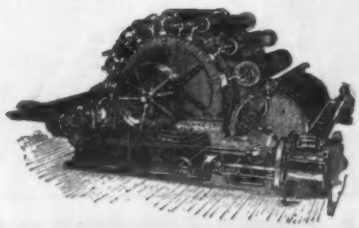
"CYCLONE" DRYERS

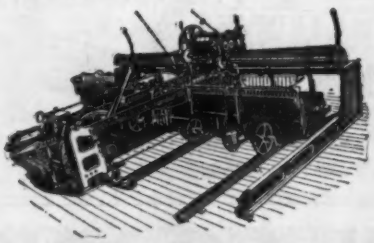
For Cotton Stock, Wool Stock, Rags,
Yarn, Cloth, Underwear, Stockings, Etc.



"PROCTOR"
Garnett Machines and Pickers

For reducing to fibre Cotton and Woolen
Waste, Cloth Clippings, Etc.





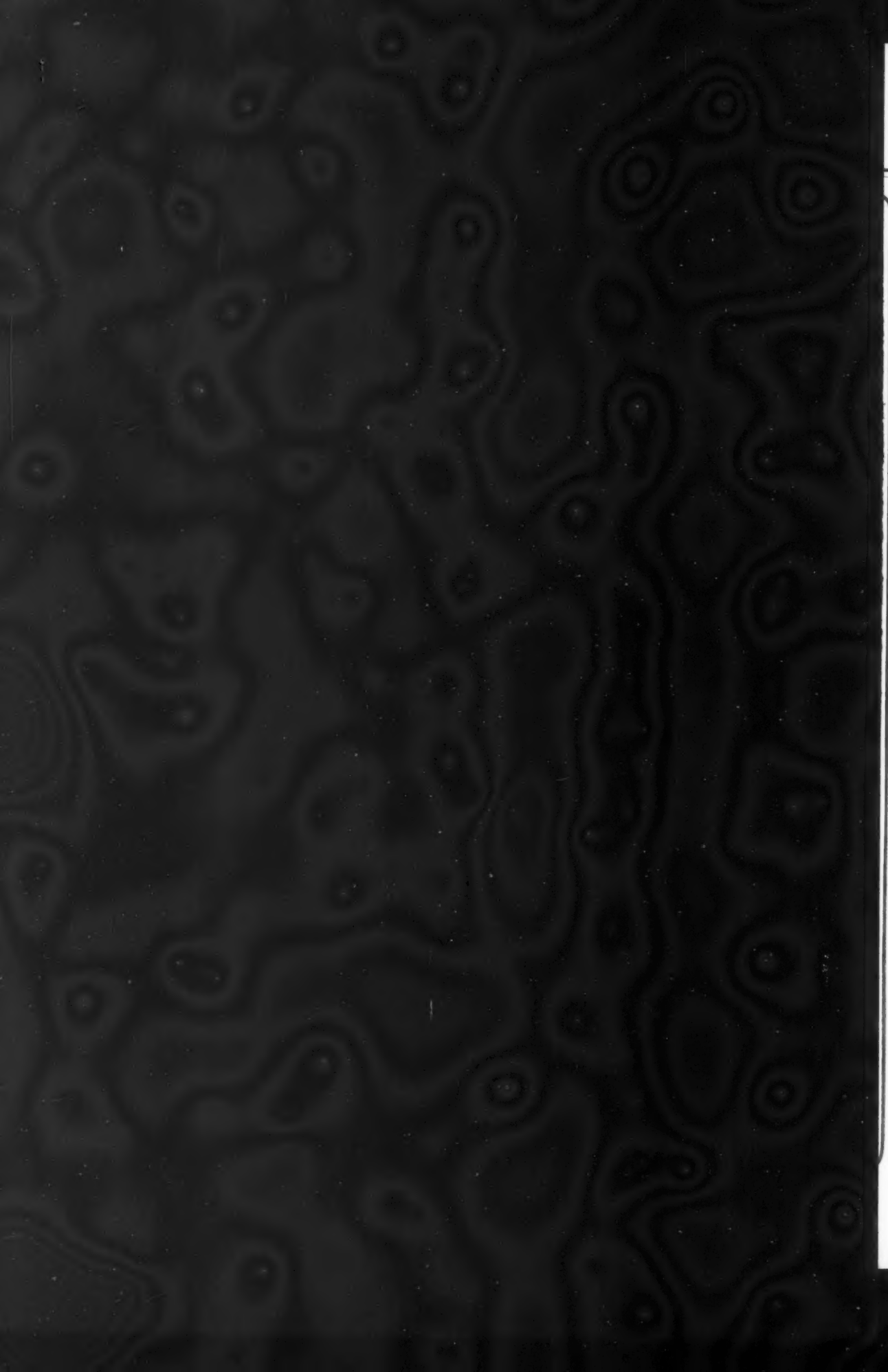
"FURBUSH" Woolen Mill Machinery

Including Pickers, Cards, Mules, Twisters,
Warpers, Dressers, Spoolers, Etc.

Manufactured by

THE PHILADELPHIA TEXTILE MACHINERY CO.,

Hancock and Somerset Sts., - PHILADELPHIA, PA.



The Success of the Advertising

of **Moneybak Silks** is told in this issue of the TEXTILE WORLD RECORD. It will be found interesting by any textile manufacturer and, to those about to advertise, it will be particularly instructive.

We have reprinted the articles on Textile Advertising which have appeared during the last year, and will be glad to send a set to any seeker of textile advertising information.

THOMAS BALMER, Advertising Manager Butterick Trio, Butterick Building, New York

Read pages 109 111 in this issue and learn how the York Silk Manufacturing Co. successfully advertised Moneybak Silks

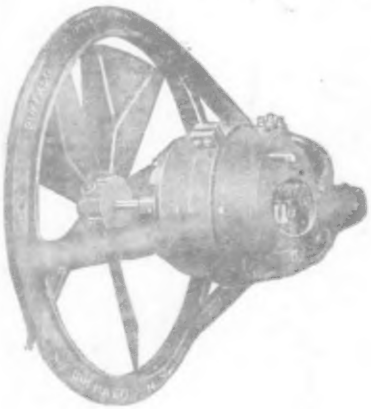
The three advertisements herewith reproduced appeared in the February, March and April issues of The Butterick Trio

THE NEW FOSTER WINDER

OPEN WIND from start to finish of cone.
No press-offs from knots, no flattening of yarn.
The only perfect system of winding yarn.
for knitting purposes.

TUBE WINDERS, SKEIN WINDERS, DOUBLERS.

FOSTER MACHINE COMPANY,
WESTFIELD, MASS.

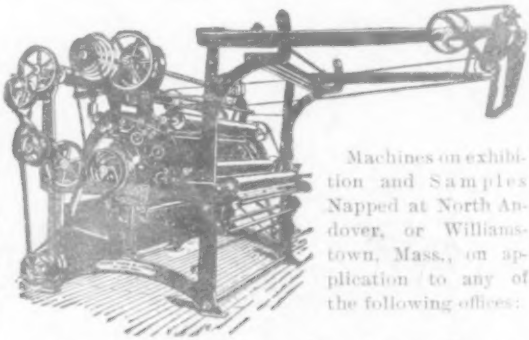


"The air pure and cool refreshes the soul" About some parts of your mill the men will never say that. Make life tolerable there. Buffalo Disk Fans the remedy; hot weather's ahead.

Buffalo Forge Company,
Buffalo, N. Y.

THE AMERICAN NAPPING MACHINE CO.

Own the principal patents on Napping Machines, representing the latest French, English and American Patents.



Machines on exhibition and Samples Napped at North Andover, or Williamstown, Mass., on application to any of the following offices:

Davis & Furber Machine Co.,
Builders and Selling Agents, ... North Andover, Mass.
Geo. S. Harwood & Son, 53 State St., Boston.
H. P. HEAP, Treasurer and General Manager
WILLIAMSTOWN, MASS.

Walworth Manufacturing Co.,

HIGH PRESSURE

VALVES AND FITTINGS

"Walmanco" Pipe Flanges,
"Never Stick" Blow-off Cocks, Mill Supplies.

GENERAL OFFICES:
132 FEDERAL STREET, BOSTON, MASS.
New York Office: Park Row Building.